

Noise Assessment for a Proposed Retail and Leisure Development

at

Edge Lane Central Retail Park, Liverpool

24th September 2010

Produced for
Derwent Holdings Ltd

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Document Control Sheet

Project Title Edge Lane Central Retail and Leisure Park, Liverpool


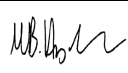
Report Title Noise Assessment for a Proposed Retail and Leisure Development, Edge Lane, Liverpool

Revision 1025014/Noise/24-09-10/V004

Status Final

Control Date 24th September 2010

Record of Issue

Issue	Status	Author	Date	Check	Date	Authorised	Date
1	Draft	P Tallantyre	24/2/10	M Hyden	27/2/10		
							

Distribution

Organisation	Contact	Copies
DPP	Mark Aylward	1e
		5h + 1CD

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Summary

Mouchel have been commissioned by DPP, acting on behalf of Derwent Holdings Ltd, to undertake a noise assessment to accompany a planning application to be submitted to Liverpool City Council associated with the proposed Edge Lane Central Retail and Leisure Development, at the site of the former Edge Lane Central Retail Park, Liverpool.

The development as proposed includes provision for the following uses on the site; new retail and leisure park facilities, a replacement for the Rathbone Park public open space, an extension of the Rathbone Hospital, a number of small scale residential developments and replacement light industrial. Provision is also made for associated car parking and service yard facilities.

A noise survey has been completed to quantify the existing noise climate at various noise sensitive receptors around the proposed development site.

Assessment of the proposed development has been undertaken including the construction of a detailed 3-D noise model of the area. The assessment has been undertaken wholly in accordance with the requirements of appropriate UK guidance and methodologies.

It has been considered that the main noise sources associated with the proposed development would be contained within the following main classifications:

Static, fixed air conditioning/refrigeration plant

At this stage of the design process there is no data available for any static noise generating plant, as such it is recommended that appropriate conditions be attached to any planning permission.

Industrial Operations

At the current time end users and processes have not yet been identified as such it has been considered that this aspect of the development could also be controlled by a suitably worded planning condition.

Vehicle movements on site including car parks and service yards

When assessed in accordance with the appropriate standards it has been found that noise would be expected to be of '*marginal significance*' or less, however, in order to achieve this some level of inherent noise mitigation is necessary within the scope of the design of the site.

Vehicle movements off site on the public highways

The majority of routes in the vicinity of the development adjacent to highly sensitive receptors (residential dwellings, hospitals etc) would exhibit impacts of **Negligible** to **Minor** in nature. However, certain routes have been identified to experience increases of **Moderate** to **Major** as a result of the scheme but these are not in the vicinity of sensitive receptors.

Noise sensitive aspects of the development (Residential, Hospital)

Based upon the appropriate assessment methodologies and guidance, the level of information available and subject to the implementation of suitable design measures within the construction of the building structures appropriate internal noise levels can be achieved inside sensitive receptors.

Public Open Space

The measured noise levels in the vicinity of the proposed park are in excess of the WHO guidelines value to prevent serious annoyance but are not dissimilar from those experienced within the current park location.

General Conclusion

Based upon the scope of the assessment the conclusion has been drawn that due to the existing nature of the noise climate around the proposed site, it is not believed that noise generated by the proposed mixed use development will be significantly out of 'character' for the area or result in significant negative impacts relating to noise.

1 Introduction

1.1 Project Introduction

Mouchel have been commissioned by DPP, acting on behalf of Derwent Holdings Ltd, to undertake a noise assessment to accompany a planning application to be submitted to Liverpool City Council associated with the proposed Edge Lane Central Retail and Leisure Development, at the site of the former Edge Lane Central Retail Park, Liverpool.

The development as proposed includes provision for the application to develop the following uses on the site:

- Replacement and relocation of the Rathbone Park public open space to a site to the east of Mill Lane currently occupied by industrial operations to the rear of the Robins and Day Peugeot Garage;
- Extension of the Rathbone Hospital on to the site of the former Ian Skelly car showroom and the current Carpet World site;
- A number of small scale residential developments located off Mill Lane;
- New retail and leisure park facilities (approximately 47 retail units, 4 restaurant units and 1 leisure building (housing 3 occupiers)) in the location of the Existing Edge Lane Central Retail Park and Rathbone Park public open space; and
- Replacement light industrial on land immediately to the north of Edge Lane (between Edge Lane and Pensarn Road) currently occupied by a Halfords outlet, a KFC fast food restaurant, some derelict industrial buildings and other small retail units.

Associated with these aspects of the mixed use scheme would be provision for car parking facilities, service yards, mechanical plant provision, access roads and landscaped areas.

The development site is currently occupied by the existing Edge Lane Central Retail Park, industrial premises fronting onto Binns Road, and the existing Rathbone Park, all centred around the Edge Lane/Edge Lane Drive corridor, to the east of Liverpool city centre.

1.2 The Need for the Proposed Works

Noise generated and received by the operation of the proposed retail, leisure, healthcare and industrial units and associated mechanical plant and infrastructure has the potential to affect the amenity at noise sensitive receptors surrounding the site and proposed within the scope of the site.

This report examines the potential for the existing noise climate of the area and any noise likely to be generated by the operation of the proposed development and assesses the potential impact this may have on noise sensitive receptors around the site.

1.3 Site Description

The proposed development site is located on the outskirts of Liverpool within an area termed “Edge Lane Central” which is generally within the Edge Hill/Broadgreen areas of Liverpool, approximately 1.3 miles east of Liverpool City Centre. The development site is located directly adjacent to the A5047 Edge Lane and the A5080 Edge Lane Drive which form a main access route into Liverpool city centre from the M62 motorway.

The application site covers an area of approximately 18.9ha and includes a number of key sites in highly prominent positions along the Edge Lane corridor including the existing Edge Lane Retail Park, the Rathbone Recreation Ground, and the former Ian Skelly car Showroom.

The general character of the current usage of the area includes industrial/commercial facilities, healthcare, recreation (public open space) areas and residential dwellings.

1.4 Noise Assessment Methodology

In order to assess the impact of noise generated by the proposed development a number of elements of work have been required to be completed as detailed below:

- A noise survey has been completed to quantify the existing ambient and baseline noise levels at identified noise sensitive receptors around the site periphery. Noise levels have been measured during the daytime and night time periods.
- Quantitative/qualitative assessment of potential noise increases on the surrounding road network as a result of the proposed development;
- Assessment of the suitability of the noise climate of the area of the site identified for the proposed hospital extension;
- An acoustic model has been constructed to predict the level of noise incident on nearby sensitive receptors. The model includes noise generated by HGV deliveries, on site traffic movements and car parking facilities.
- The results of the model have then been compared to the measured noise levels and assessed in accordance with relevant legislation and guidance as detailed within **Section 2.2**.

2 Noise and Legislation

2.1 Noise

Before presenting the results of the noise assessment, it is considered useful to provide some background information on noise, the units of measurement and perception of changing levels by people.

Noise is defined as unwanted sound. The range of audible sound is from 0 dB to 140 dB. Examples of typical noise levels relating to everyday occurrences are presented within **Table 1** : below:

Table 1 : Typical Noise Levels

Source	Sound Pressure Level in dB(A)	Subjective Level
Traffic at kerb edge	70 – 85	Loud
Raised voice at 1 metre	80	Loud
Normal voice at 1 metre	60	Moderate
Residential area at night	40	Quiet

The frequency response of the human ear to noise is usually taken to be about 18Hz (number of oscillations per second) to 18,000Hz. However, the human ear does not respond equally to different frequencies at the same level, it is more sensitive in the mid-frequency range than the lower and higher frequencies and, because of this, when undertaking the measurement of noise the low and high frequency components of any given sound are reduced in importance by applying a filtering (weighting) circuit to the noise measuring instrument. The weighting which correlates best with the subjective nature of human response to noise and is most widely used to quantify this is the A-weighted filter set. This is an internationally accepted standard for noise measurements.

For variable noise sources within an area an increase of 3 dB(A) would be considered to be the minimum perceptible to the human ear under normal conditions. It is generally accepted that an increase/decrease of 10 dB(A) corresponds to a doubling or halving in perceived loudness. The 'loudness' of a noise, this is a purely subjective parameter, dependant not only upon the sound pressure of the event but also on the dynamics of the listener's ear, the time of the day and the general mood of the person.

With regard to environmental noise levels (in the open air), these are rarely steady, but rise and fall according to the activities being undertaken within the surrounding area at any given time. In an attempt to produce a figure that relates this variable nature of noise to human subjective response, a number of statistical noise metrics have been developed. These include:

2.1.1 L_{Aeq} Noise Level

This is the 'equivalent continuous A-weighted sound pressure level, in decibels', and is defined in British Standard BS7445 as the 'value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time'. It is the unit most suitable for the description of environmental noise.

2.1.2 L_{A10} Noise Level

The L_{A10} is the noise level that is exceeded for 10% of the measurement period, and gives an indication of the noisier portion of the climate. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

2.1.3 L_{A90} Noise Level

The L_{A90} is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the 'background' noise level.

2.2 Standards and Guidance

Following on from the brief background in noise, this section will now present information relating to the current guidance within the UK covering noise including the measurement and assessment of such.

Each of the main UK guidance or methodology documents specific to the scope of this assessment will be presented and discussed below.

2.2.1 *Planning Policy Guidance Note 24 [1]*

Principles and specific guidelines on noise and planning issues are given in the Department of the Environment's Planning Policy Guidance 24: Planning and Noise (PPG24). PPG24 represents published government guidance on planning and noise and sets out details of how local authorities in England can use their planning powers to minimise adverse impacts of noise both relating to noise sensitive developments and those that will ultimately generate noise.

The document PPG24 states the following, with respect to assessing the impact of noise on proposed residential developments;

"When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories (NECs) the proposed site falls, taking into account both the day and night-time noise levels and the main noise sources of the area".

The Noise Exposure Categories (NECs) are subsequently defined as follows:

Table 2 : PPG24 Noise Exposure Category (NEC) Definitions

Noise Exposure Category	Definition
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the higher end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused

The L_{Aeq} noise levels corresponding to the above noise exposure category definitions are as detailed within the table below:

Table 3 : PPG24 NEC Noise level Bands

Noise Levels Corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB, PPG24				
Noise Source	Noise Exposure Category			
	A	B	C	D
Road Traffic				
07:00 – 23:00	< 55	55 – 63	63 – 72	>72
23:00 – 07:00	< 45	45 – 57	57 – 66	>66
Rail Traffic				
07:00 – 23:00	< 55	55 – 66	66 – 74	>74
23:00 – 07:00	< 45	45 – 59	59 – 66	>66
Air Traffic				
07:00 – 23:00	< 57	57 – 66	66 – 72	>72
23:00 – 07:00	< 48	48 – 57	57 – 66	>66
Mixed Sources				
07:00 – 23:00	< 55	55 – 63	63 – 72	>72
23:00 – 07:00	< 45	45 – 57	57 – 66	>66

As detailed within **Table 3** above, PPG24 defines NEC categories for both the daytime and night-time periods. Daytime is subsequently defined within the document as being between the hours of 07:00 and 23:00 with night-time being defined as the period 23:00 to 07:00.

Local planning authorities have the power under PPG24 to increase NEC limits by up to 3dB(A) above the recommended levels where for example there is a clear need for the development.

With regard to night-time noise levels where individual noise events regularly exceed 82dB L_{Amax} several times in any one hour, the site should be considered to be within NEC “C” regardless of the $L_{Aeq,8h}$ except when the site is already within NEC “D”.

As detailed above, PPG24 sets out the Noise Exposure Category assessment methodology for assessing site suitability, however it states within Paragraph 4 of Annex 1 that “*The NEC procedure is only applicable to circumstances where consideration is being given to introducing residential development into an area with an existing noise source, rather than the reverse situation where new noise sources are to be introduced into an existing residential area*” and references the use of BS4142: 1997 where industrial/Commercial development is proposed (PPG24, Annex 3, Para 19).

2.2.2 *British Standard 4142:1997 [2]*

This British Standard provides a methodology for assessing the likelihood of complaints arising from sensitive receptors due to industrial and commercial activities. It states that ‘complaints are likely’ when a noise from one of these sources, corrected for tonal, impulsive or irregularity characteristics (to provide the ‘rating’ level), exceeds the existing ‘background’ level, referred to as the L_{A90} (the noise level exceeded for 90% of the time), by 10dB(A) or more. Increases of 5dB(A) above existing background are deemed by the Standard to be of ‘marginal significance’, whilst a rating level of more than 10dB(A) below the measured background level provides a ‘positive indication that complaints are unlikely’.

The source noise is assessed in terms of $L_{Aeq,T}$, where ‘T’ is a reference period of one hour during daytime hours (07:00 - 23:00hrs) and five minutes at night-time (23:00 – 07:00hrs).

However, the Standard states that the assessment methodology provided is neither suitable for assessing internal noise levels or where the background and rating noise levels are both very low (i.e. below 30dB L_{A90} and approximately 35dB $L_{Ar,T}$ respectively). Where this occurs it is considered appropriate to reference the guidance provided in British Standard BS8233: 1999 – Sound Insulation and Noise Reduction for Buildings – Code of Practice and where appropriate the World Health Organisation ‘Guidelines for Community Noise’ and the recently published ‘Night Noise Guidelines for Europe’.

2.2.3 *British Standard 8233 ‘Noise Reduction and Sound Insulation for Buildings – Code of Practice’. [3]*

When internal levels are considered, PPG24 recommends that guidance on suitable internal noise levels can be found in BS8233: 1999. This standard provides guidance values for a range of design criteria levels within commercial and residential properties as shown in **Table 4** below.

Table 4 : BS8233 Guidance Values

Criterion	Typical Situation	Design Range dB $L_{Aeq,t}$	
		Good	Reasonable
Reasonable resting / sleeping conditions	Living rooms	30	40
	Bedrooms	30	35
Reasonable conditions for work	Cellular Office	40	50

For a reasonable standard in bedrooms at night, the Standard states that individual noise events should not normally exceed 45dB L_{Amax} .

2.2.4 World Health Organisation 'Guidelines for Community Noise' and 'Night Noise Guidelines for Europe'

In Guidelines for Community Noise, the World Health Organisation (WHO) considers that the $L_{Aeq, 8hr}$ noise level "should not exceed 30 dB indoors, if negative effects on sleep are to be avoided", and "At night-time, outside sound levels about 1 m from facades of living spaces should not exceed 45 dB L_{Aeq} , so that people may sleep with bedroom windows open".

The WHO also considers that, "To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq} ".

With regard to Hospitals and healthcare facilities, the WHO proposes that the critical effects with regard to noise disturbance relate to sleep disturbance, annoyance, and communication interference, including warning signals. The WHO therefore recommends the following guideline internal noise criteria for health care facilities and hospitals.

Table 5 : WHO Guidance Values for Hospitals

Location Description	Recommended noise limits	
	L_{Aeq}	$L_{Amax(F)}$
Rooms in which patients are being treated or observed	35dB	N/a
Hospital, Ward Rooms, indoors during the daytime and evening	30dB	N/a
Hospital, Ward Rooms, indoors during the over night period	30dB	40dB

The later 2009 WHO publication entitled 'Night Noise Guidelines for Europe', which is considered to be a complementary document to the 1999 WHO guidelines, discusses the issue of night-time noise and sleep disturbance relating to sub clinical (biological) adverse health effects.

The 2009 document does not provide over night internal noise limits specifically associated with hospitals but does detail that "*The thresholds for sleep disturbance are now known to be lower than L_{Amax} of 45 dB for a number of effects*". The 2009 document proposes a external night noise guideline (NNG) of 40 dB_{Lnight,outside} during the part of the night when most people are in bed stating "*this can be considered a health-based limit value of the night noise guidelines (NNG) necessary to protect the public, including most of the vulnerable groups such as children, the chronically ill and the elderly, from the adverse health effects of night noise*".

However in relation to situations where, in the short term achieving the NNG target level (40dB(A)) is not feasible an interim target (IT) is suggested of 55 dB_{Lnight,outside}. The document states, however, that "*it should be emphasized that IT is not a health-based limit value by itself. Vulnerable groups cannot be protected at this level. Therefore, IT should be considered only as a feasibility-based intermediate target which can be temporarily considered by policy-makers for exceptional local situations*".

- 2.2.5 *Department of Health - Health Technical Memorandum (HTM) 08-01: Acoustics*
With regard to noise levels within hospital developments the guidance of the Department of Health Specialist Services Health Technical Memorandum (HTM) 08-01: Acoustics should be referenced.

This document provides details of appropriate internal noise criteria and performances that should be taken into account within the design stage of any hospital development.

Within the scope of any later detailed acoustic design work associated with this aspect of the development the information within Table 1 of the document should be referenced in order to ensure that acceptable internal noise levels are met as a result of the intrusion of external noise sources. For reference, a number of the key spaces that may be included as part of the proposed extension to the Rathbone Hospital are detailed within **Table 6** below along with appropriate noise limits.

Table 6 : HTM 08-01 acceptable internal noise levels

Room Type	Example	Criteria for noise intrusion to be met inside the spaces from external sources (dB)
Ward – single person	Single-bed ward, single-bed recovery areas and on-call room, relatives' overnight stay	40 $L_{Aeq, 1hr}$ daytime 35 $L_{Aeq, 1hr}$ night 45 $L_{Amax, f}$ night
Ward – multi-bed	Multi-bed wards, recovery areas	40 $L_{Aeq, 1hr}$ daytime 35 $L_{Aeq, 1hr}$ night 45 $L_{Amax, f}$ night
Open clinical areas	A&E	45 $L_{Aeq, 1hr}$
Circulation spaces	Corridors, hospital street, atria	55 $L_{Aeq, 1hr}$
Public areas	Dining areas, waiting areas, playrooms	50 $L_{Aeq, 1hr}$
Operating theatres	Operating theatres	40 $L_{Aeq, 1hr}$ 50 $L_{Amax, f}$

Within the scope of any detailed acoustic design of the hospital extension, the above criteria would be considered as suitable design targets.

2.2.6 *BS 5228 'Code of practice for noise and vibration control on construction and open sites' 2009. [5]*

With regard to noise from construction and demolition works PPG24 refers to the advice and assessment methodologies contained in BS5228.

Both the 1984 edition, as referenced within PPG24, and the later 1997 revision of the BS 5228 have both now been replaced by a very recent 2009 edition.

The 2009 revision of BS5228 entitled "Code of Practice for noise and vibration control on construction and open sites" is set out in two parts, Part 1 dealing specifically with noise and Part 2 with ground borne vibration. This revision of the noise aspects of BS5228 now not only provides a calculation methodology for the prediction of mechanical fixed and mobile plant but also provides details of example assessment criteria that can be used to assess the impact of construction noise.

2.2.7 *The Design Manual for Roads and Bridges [6]*

The Design Manual for Roads and Bridges (DMRB), HA213/08, Volume 11, Section 3, Part 7¹, provides advice on the assessment of noise and vibration impacts due to road traffic.

It provides guidance on assessing the potential magnitude of impact of changes in noise and vibration levels on sensitive receptors.

3 Noise Survey Results

3.1 Survey Details

This section of the report will describe the noise measurements completed at the identified receptor locations around the proposed development site at the Edge Lane Central Retail Park, Liverpool.

3.1.1 Measurement Locations

The monitoring locations and monitoring methodology used during the establishment of the baseline noise climate of the area were agreed in advance with Liverpool City Council (LCC) Environmental Protection Unit¹. However due to site specific issues and revisions to the site layout certain of the locations required to be changed during the site survey works.

The measurement locations used within the survey are detailed below and presented graphically on Figure 1.

Location 1 (National Grid Ref: SJ 38391 90762)

The meter was located at the pavement edge of Edge Lane next to a small brick wall, in front of ARC Car Wash, approximately 1.5m above ground.

Location 2 (National Grid Ref: SJ 38761 90843)

The sound level meter was located on Gidlow Rd, approximately 2m from the nearest façade and 1.5m above ground.

Location 3 (National Grid Ref: SJ3842090807)

The sound level meter was located 1.5m above ground approximately 1m from the railway fence, approximately 2m behind the electrical sub station.

Location 4 (National Grid Ref: SJ3849990382)

The sound level meter was located on soft ground in front of the industrial unit within the Wavertree Technology Park, approximately 1.5m above ground.

Location 5 (National Grid Ref: SJ3888890578)

The sound level meter was located at the end of Runic Street approximately 1.5m above soft ground and 2m from a 1.8m brick wall, in line with the nearest façade.

Location 6 (National Grid Ref: SJ3911690647)

The sound level meter was located approximately 1.5m above hard ground, in line with the nearest façade on the pavement next to Borax Rd. The meter was located 2m from the nearest façade.

¹ Telephone conversations and subsequent e-mail transmissions between Peter Tallantyre (Mouchel) and Dr Ian Rushforth (LCC Environmental Protection Unit) between the 30th November and 2nd December 2009.

Location 7 (National Grid Ref: SJ3932890561)

The sound level meter was located on the pavement adjacent to an abandoned industrial/commercial unit off Mill Lane approximately 2m from the nearest façade and 1.5m above hard ground.

Location 8 (National Grid Ref: SJ3932790758)

The sound level meter was located adjacent to Mill Lane to the north of Edge Lane next to a metal rail fence, approximately 1.5m above hard ground.

3.1.2 Basic Details

Daytime noise measurements were completed between 1000hrs and 1900hrs on Friday the 4th December 2009.

Night-time measurements were completed between 00:00hrs on Monday the 7th December 2009 and 04:00hrs on Tuesday the 8th December 2009 respectively.

The measurements were attended by the following Mouchel personnel:

Table 7 : Mouchel Survey Personnel

Name	Position
Mark Harrison	Acoustic Technician
William Neale	Acoustic Technician

3.1.3 Equipment

During the surveys undertaken the following Type 1 specification equipment was utilised:

Table 8 : Monitoring Survey Equipment

Description	Manufacturer	Type	Serial No.
Sound level meters	01dB	Solo	61331
	Norsonic	118	31786
Calibrator	Norsonic	1251	31460

During all measurements undertaken the sound level meters were tripod mounted with the microphone at least 1.5m above ground level and fitted with a manufacturer specification wind shield. The sound level meters were calibrated at the beginning and end of the survey period with no significant drift in calibration level observed.

The calibration certification for the equipment used within the surveys is contained within **Appendix 2**.

3.1.4 Weather Conditions

Daytime Thursday 3rd December 2009

Weather conditions were noted to be overcast, but dry. Measured wind speeds varied between 0 and 0.7 m/s and the ambient air temperature was noted to be between approximately 4.5°C and 7.5°C. Cloud cover was noted to be approximately 90% and high level. Road surfaces in the area were noted to be slightly damp.

Night-time Friday 8th December 2009

Weather conditions were predominantly dry with brief, occasional showers. Wind speeds varied between 0 and 2 m/s and the ambient air temperature was between approximately 7°C and 8°C. Cloud cover was noted to be approximately 75% and high level. Road surfaces in the area were noted to be wet.

3.1.5 Noise Survey Results

Table 9 and **Table 10** below, detail the results of the short duration daytime and night-time noise measurements undertaken within the scope of this study. The measurements have been split into 60 minute periods during the daytime and 30 minute periods during the overnight.

Table 9 : Daytime Results

Location	Date	Start time	Run duration (hh:mm:ss)	Statistical Parameters in dB(A)		
				L _{eq}	L ₉₀	L _{max}
1	04/12/09	16:07	00:60:00	71.1	65.0	90.9
		17:07	00:27:00	75.9	65.2	100.1
2	04/12/09	16:04	00:60:00	55.3	48.7	86.8
3	04/12/09	18:05	00:45:00	70.3	58.6	81.4
4	04/12/09	10:24	00:60:00	58.4	50.4	79.6
		11:24	00:30:00	59.6	50.5	72.1
5	04/12/09	10:18	00:60:00	54.0	48.5	78.3
		11:18	00:60:00	52.4	48.5	70.6
6	04/12/09	14:16	00:60:00	61.7	54.9	88.3
		15:16	00:30:00	60.6	54.3	76.0
7	04/12/09	12:52	00:60:00	68.2	56.9	90.9
		13:52	00:15:00	67.7	56.9	79.9
8	04/12/09	12:22	00:60:00	61.3	53.9	77.4
		13:22	00:60:00	62.2	55.0	85.1
		14:22	00:60:00	62.1	55.0	82.4

Table 10 : Night-time Results

Location	Date	Start time	Run duration (hh:mm:ss)	Statistical Parameters in dB(A)		
				L _{eq}	L ₉₀	L _{max}
1	08/12/09	02:23	00:30:00	66.9	52.0	82.3
2	08/12/09	03:00	00:25:00	47.1	38.3	69.7
3	08/12/09	01:46	00:30:00	61.6	39.7	77.7
4	08/12/09	Commercial Location – not monitored at night				
5	08/12/09	01:06	00:30:00	47.2	43.6	62.3
6	08/12/09	00:28	00:30:00	56.0	49.3	74.5
7	08/12/09	23:59	00:25:00	60.4	47.7	77.1
8	08/12/09	03:34	00:30:00	54.6	42.7	71.4

3.1.6 Noise Sources

Table 11 below presents details of the audible sources of noise during the survey periods at each of the measurement locations.

Table 11 : Description of Noise Sources

Location	Measurement Period	Description of Noise Sources
1	Daytime	Edge Lane Traffic, start-stop
	Night-time	Edge Lane traffic, free flowing.
2	Daytime	Edge Lane traffic dominant, but distant. Some local traffic
	Night-time	Distant traffic noise from Edge Lane
3	Daytime	Edge Lane traffic, free-flowing
	Night-time	Edge Lane traffic, free flowing. Occasional trains.
4	Daytime	Bird song, traffic on local roads, industrial noise (scrap yard)
	Night-time	N/A
5	Daytime	Edge Lane dominant. Seagulls on playing field. Residents
	Night-time	Edge Lane traffic, free flowing.
6	Daytime	Traffic from Edge Lane, Rathbone Rd – backed-up at lights
	Night-time	Traffic from Edge Lane, Rathbone Rd, free flowing.
7	Daytime	Edge Lane, Mill Lane traffic. Noises from Peugeot garage
	Night-time	Edge Lane, Mill Lane traffic, free flowing
8	Daytime	Edge Lane traffic, local traffic (deliveries to Public House)
	Night-time	Edge Lane Traffic, free flowing

4 Noise Modelling and Predictions

4.1 Noise Prediction

This section of the report will examine the calculation methodologies used to predict the noise levels at the identified sensitive receptors associated with the various sources of noise within the proposed development. This section further details any assumptions that have been made during the modelling process in order to conclude the predicted noise levels.

4.1.1 Noise Prediction Elements

The aspects of the proposed site that will generate noise and therefore require predictive modelling can be broken down into the following three main elements:

- Operational noise from the proposed site including deliveries/service yard noise and any fixed plant.
- Noise from the car park and access roads.
- Noise levels from vehicles on the surrounding road network as a result of the development.

4.2 Operational Noise Methodologies and Assumptions

This section of the predictive works will examine the noise generated by the operation of the proposed site in order to predict noise levels likely to be incident on nearby noise sensitive receptors.

As the noise sources are mainly commercial and industrial in nature they can be classified acoustically as 'industrial type noise'. As a result of this it is necessary to assess these noise sources in accordance with the methodology of BS4142 where appropriate. Therefore, the assessment would be based upon a typical 1 hour period during the daytime operations, whilst at night-time an assessment period of 5 minutes will be utilised.

For each of the main sources of noise associated with the development, the methodology used to predict noise levels associated and any assumptions made within the modelling are discussed in more detail below:

4.2.1 Service Yard Noise and HGV access

Typically the dominant noise source within any service yard area would be Heavy Goods Vehicles (HGV) movements coupled with noise associated with vehicles idling (refrigerated HGVs) and being unloading.

Within the scope of the development proposals it has been assumed that deliveries would be undertaken throughout the full 24 hour period, with only limited deliveries assumed during the overnight period.

Assuming standard 'good practice' techniques are utilised and that unloading would be undertaken directly from the loading bay into buildings, noise from unloading operations are unlikely to be significant when compared to noise from vehicle movements and vehicles idling. It has further been assumed that there will be a no idling policy for HGV's on the development site in place associated with each of the tenancies on each of the units within the development.

Discussions held with representatives from Sanderson Associates Consulting Engineers (SACE)², the traffic and transportation consultant on the project, concluded that HGV movements associated with the proposed development are not considered likely to increase above those currently occurring to supply the existing Edge Lane Central Retail Park and surrounding industrial uses. Therefore, within the 1 hour assessment window (as required by BS4142) as a worst case, the assumption that 1 HGV delivery would occur per service yard within the development would be appropriate. However, SACE did consider that this could present somewhat of an over-estimation of the actual activity within the service yard areas. However, Mouchel would consider that in order to present a robust assessment this was an appropriate assumption.

Within the model noise levels generated by the HGV movements have been calculated based on the linear 'Haul Road' methodology of BS5228 and line source distance attenuation of ISO9613. Source height of the HGV's has been assumed as 0.5m to represent the approximate height of the exhaust and engine. It has also been assumed within the calculations that the sound power level of a HGV under acceleration is 105.5 dB(A) as stipulated as a maximum permitted value in EC Directive 92/97/EC.

4.2.2 *Plant Noise*

At this stage of the development no information is available relating to the specifics of any fixed noise generating plant such as air conditioning fans or refrigeration plant that are to be utilised within the scheme, where they would be located or the required hours of operation.

As there is no data available for fixed plant it cannot be included within the predictive modelling. However, it is possible to set plant noise emission limits which could then be used to form the basis of an appropriately worded planning condition to control noise generated by static plant associated with the development.

Within the scope of the design of any such plant the following key issues should be borne in mind:

² Telephone conversation and subsequent E-mail transmissions between Peter Tallantyre (Mouchel) and Karen Smith (SACE) on the 1st and 2nd December 2009.

- Any such external fixed plant should, as far as possible, be located on façades not facing directly onto any sensitive residential receptors.
- The noise levels emitted from any such equipment should be attenuated by appropriate source noise control techniques to ensure that they do not exceed a 'rating level' of existing $L_{A90} + 5\text{dB(A)}$ external to any adjacent inhabited property /sensitive receptor.
- Potentially noisy plant and equipment should only be used when necessary and switched off when not in use

Upon finalisation of the specific equipment required and the location of such, further acoustic assessment would be required in order to ensure that the operation of such equipment does not have a detrimental effect on the noise climate of the area.

4.2.3 *Industrial Operational Noise*

Similarly to plant noise, as specified within Section 4.2.2, above the same is apparent relating to noise associated with the uses of the proposed industrial operations.

Within the scope of the proposed development the industrial operations would conform to the following use classes as defined within Statutory Instrument 1987 No. 764 - The Town and Country Planning (Use Classes) Order 1987.

- B1(a) - Office use other than a use defined within class A2 (financial and professional services);
- B2 - General Industrial uses other than those falling within class B1 or within classes B3 to B7; and
- B8 - Storage or distribution centres restricted in this case to "trade counter" type of operations

At the current time, other than the defined use classes, no information is available relating to the actual operations proposed within these industrial starter units. Covered within the use classes B1(a), B2 and B8(trade counters) are numerous potential operations, employing a myriad of plant and equipment combinations which would ultimately govern the noise generated by said operations. The noise levels generated by the operations within has a direct bearing on the specification of the building structure required in order to contain the noise and thus ensure that noise levels at the closest residential/sensitive receptors remain acceptable.

It is therefore proposed that this aspect of the development hereby proposed be conditioned, within an appropriately worded planning condition, that suitable noise assessment relating to the exact specifics of each proposed operation be supplied and approved by LCC as each potential tenant becomes identified.

Further to this, it is proposed by Derwent Holdings and DPP that certain of the use classes be restricted on the site as to which units they can occupy. In general use type B2 operations would not be located on the aspect of the industrial park directly adjacent to the residential properties on Pensarn Road, this area would be restricted to type B1(a) operations which would be more suitable in close proximity to residential properties.

Within the scope of the traffic assessment completed by Sanderson Associates Consulting Engineers, certain provision for the proposed industrial units has been taken into account and as such assessment of the impact of noise associated with these potential operations is taken into account within the traffic noise assessment. The specifics of the parameters assumed within the traffic assumptions for this aspect of the development would be contained within the traffic and transportation report.

Furthermore, within the noise model constructed of car parks, HGV movements and car movements associated with the development, account has been taken of the provision for car parking space and deliveries associated with these industrial operations.

4.2.4 *Access Road and Car Park noise*

Noise generated by vehicles using the proposed access roads and car parks has the potential to impact upon nearby noise sensitive receptors. In this section of the report the prediction methodology utilised for the car parks and access roads will be discussed.

Access Road Noise Levels

Noise from the access road has been calculated using the BS5228 linear 'Haul Road' methodology and line source distance attenuation of ISO9613. It has been assumed that the sound power level of a standard car under acceleration is 99.5 dB stipulated as a maximum permitted value in EC Directive 92/97/EC. Based on the traffic data supplied by Sanderson Associates Consulting Engineers (SACE) (**Appendix 1**) **Table 12** below details the traffic flows (access and egress) along the access roads within the peak hours as assumed within the model:

Table 12 : Access Road Traffic Flows

Access Point	Assessment period	Total two way access and egress Vehicle Movements (2020)
Main access off Edge Lane via the former Melrose Way	Peak Hour weekday AM	170
	Peak Hour weekday PM	538
	Peak Hour Saturday	918
Access to units A-D off Milton Road	Peak Hour weekday AM	63
	Peak Hour weekday PM	384
	Peak Hour Saturday	804
Access to the proposed Industrial Operations and existing fast food outlets off Edge Lane	Peak Hour weekday AM	30
	Peak Hour weekday PM	33
	Peak Hour Saturday	33
Access to the leisure complex off Rathbone Road	Peak Hour weekday AM	63
	Peak Hour weekday PM	154
	Peak Hour Saturday	430
Access to the Rathbone Hospital Extension off Mill Lane	Peak Hour weekday AM	25
	Peak Hour weekday PM	24
	Peak Hour Saturday	34

Car Park Noise Levels

With regard to the car parking facilities, in the absence of any UK methodology for the prediction of noise from car parks, calculations have been undertaken in line with the methodology of revisions 3 and 4 the Parkplatzlärmstudie des Bayerischen Landesamts für Umweltschutz (Bavarian Parking Lot Study of the Bavarian department for Environmental Protection).

The source calculation of the Bavarian methodology as used converts the number of movements per bay of the car park per hour and the number of bays within the car park into an area noise source for inclusion within the model.

Information supplied to Mouchel concluded that within the scope of the development the following car park facilities would be provided:

- Retail and Leisure Aspects – 1939 spaces separated into 4 areas (including 2 undercrofts)
- Industrial Operations -65 spaces
- Rathbone Hospital Extension – 97 spaces

As a result of the fact that the different vehicle numbers are expected to access the various car parks during the peak hours of the normal working weekday from those on a peak weekend period it is proposed to assess both the weekday PM peak period (as a weekday daily worst case) and the weekend (Saturday) peak period. Based upon the numbers of vehicles accessing each of the car parks during these assessment periods the following is concluded with regard to the usage of each space within the car parks:

Main Retail Area	– 0.36 vehicles per space per hour during the weekday PM peak and 0.60 vehicles per space per hour during the weekend peak period;
DIY Retail Area	– 0.70 vehicles per space per hour during the weekday PM peak and 1.49 vehicles per space per hour during the weekend peak period;
Industrial Operations	– 0.63 vehicles per space per hour during the weekday PM peak and 0.61 vehicles per space per hour during the weekend peak period;
Rathbone Hospital Extension	– 0.25 vehicles per space per hour during the weekday PM peak and 0.35 vehicles per space per hour during the weekend peak period;

This information forms the basis of the car park noise calculations undertaken within the scope of the noise modelling exercise.

4.2.5 *Traffic Noise Levels on Surrounding Routes*

Traffic flow data for a number of roads surrounding the development has been supplied by Sanderson Associates Consulting Engineers (SACE) in peak hour AM, PM and weekend peak flow turning counts, this data is presented in **Appendix 1**.

This data details the expected traffic flows on the various routes for 2010 (no development only) and following complete opening in 2020. The development flow information presented within **Appendix 1** is PCU data, however, SACE have confirmed that an appropriate assumption would be that the development would only generate car movements and hence the PCU counts reflect the number of cars (1 x PCU = 1 x car).

These 2020 base flows have been estimated using the methodology dictated by Sanderson Associates Consulting Engineers from the 2010 peak hour traffic flows using the TEMPRO growth factors as detailed below:

Weekday am peak TEMPRO Growth Factor	1.1753
Weekday pm peak TEMPRO Growth Factor	1.172
Saturday TEMPRO Growth Factor	1.1703

SACE have further informed Mouchel that the proposed redevelopment of the Edge Lane Central Retail Park would generate no further HGV movements to those already generated. SACE consider that the proposed development would only result in additional car movements on the wider road network.

4.3 Foundation of the noise model

In order to predict the noise emitted by the proposed development site a detailed 3D noise model has been constructed using the commercially available Braunstein + Berndt GmbH computer noise modelling software SoundPLAN 7.0. The software implements the appropriate calculation methodologies for both the UK and EU as discussed previously for each aspect of the site.

The noise model was constructed using the following information provided to Mouchel and based on the generic assumptions detailed below:

- Detailed AutoCAD OS mapping data of surrounding area as supplied by AEW Architects;
- Detailed site layout drawings as supplied by AEW Architects on the 23rd September 2010 (drawing ref: M3458_F-2003J);
- Information regarding traffic movements and numbers (quantity and location) as supplied by Sanderson Associates Consulting Engineers via DPP on the 16th September 2010;
- Existing residential buildings within the area have been assumed to be 6m high in all cases;
- Existing commercial buildings within the area have been assumed to be 8 - 10m high in all cases with the exception of the proposed development;
- The ground cover in the area of the proposed site has been assumed to be 100% hard ground such as concrete, paved and bituminous surfaces;
- Distance, barrier and ground absorption corrections have been calculated using the methodology of the International Organisation for Standardisation 9613 Acoustics – Attenuation of Sound during Propagation Outdoors due to the inherent limitations within the BS5228 methodology with regard to predictions at separation distances in excess of 300m.

Within the scope of the noise model constructed for the development the following mitigation measures have been assumed to be included within the specification of the site:

- It has been assumed that the construction specifications of the external building envelopes of the retail, leisure and industrial units would be such designed to ensure that noise generated within is, as far as practicable, entirely contained.
- There has been assumed to be a “no idling” policy with regard to delivery HGV’s on any aspect of the development in place enforced within the tenancies of each of the units within the development;

- The service yards have been assumed to be surrounded by an acoustic fence/robust brick built wall structure of 3.0m in height. The location of the fencing is presented within Figure 5;
- An acoustic barrier (fence/robust brick built wall/landscaped bund structure) of no less than 2.5m effective height above the surface of the road leading into the Leisure facility undercroft car park would be required . The location of the barrier is presented within Figure 5;
- The acoustic fence/robust brick built wall to the rear of the service yard associated with the industrial operations to the north of Edge Lane (former Halfords site) would require to be to a height of 3.0m with a no idling policy in place with the operators;
- All fixed mechanical air conditioning/refrigeration plant has been assumed to be adequately acoustically controlled at source to ensure that it would not unduly impact on the existing noise climate of the area as detailed within **Section 4.2.2.**
- The Industrial facilities to the north of Edge Lane would be suitably designed and specified such to ensure that noise would not cause undue impacts on any adjacent residential properties as detailed within **Section 4.2.3.**

5 Noise Assessment

In this section of the report the results of the assessment would be presented, split into the following main sections:

Leisure, Retail and Industrial aspects of the Development

- On site noise – including operational noise (deliveries/service yard noise) and noise from the car parks/access roads.
- Off site noise – assessment of vehicles on the surrounding road network as a result of the development.

Public Open Space

- Suitability of the proposed area of the site, identified for the relocation of Rathbone Park, for development as public open space;

Hospital Extension Development

- Suitability of the proposed area of the site, identified for the Rathbone Hospital Extension, for development as health care facilities;

Small Residential Aspect of the Development

- Suitability of the proposed area of the site to the north of Edge Lane Drive off Mill Lane (adjacent to the Finchley Special School), identified for a small residential development of approximately 6 units;
- Assessment of the residential aspect of the development proposals off Mill Lane to the rear of the Robins and Day Peugeot Garage. This assessment is contained within an accompanying Mouchel report ref: 1025014/V003/100913.

5.1 On Site Noise Assessment and Discussion

5.1.1 *Operational Noise – Leisure, Retail and Industrial*

As the proposed site is mixed usage in nature containing commercial and industrial elements, the generated noise can therefore be described, acoustically, as akin to 'industrial' type noise. It will therefore be necessary to assess the impact in accordance with BS4142 where appropriate.

Within the methodology of BS4142 it is necessary to calculate a specific noise level at each receptor location from the operations/site under consideration. This Specific noise level then requires to be converted to a Rating level in order to take account of tonal or noticeable characteristics of the source noise.

It is not considered unreasonable to assume that, based upon the current nature of the area (road traffic/commercial/industrial) and the previous uses of the site, noise associated with HGV and car movements would not be out with the existing character of the Edge Lane area, therefore it has been assumed that the +5 dB BS4142 feature correction would not be appropriate or required to be added to the predicted noise levels.

5.1.2 *Noise from fixed Plant and Industrial Units*

As discussed in detail within **Sections 4.2.2** and **4.2.3** of this report there is no available data relating to either the proposed industrial operations accounting for the light industrial aspect of the development or relating to fixed noise generating plant associated with the leisure, retail or hospital aspects of the development. It has therefore been suggested that noise emissions from these aspects of the development be controlled through a suitably worded planning conditions.

5.1.3 *Cumulative On-Site Noise Assessment*

As a result of the nature of the proposed development the noise generated at any one time will be as a function of all of the operations and activities being undertaken at that time. During the daytime this would include car park movements, HGV movements in service yards. However during the overnight period this would only include HGV movements within service yards alone.

These cumulative site activity levels have been assessed in line with the guidance and methodology of BS4142. The noise contour plots within **Figures 2 to 4** depict this assessment for the weekday PM peak, Weekend Peak and overnight scenarios.

Table 13 below presents the results of this assessment for each of the identified sensitive receptors during the weekday PM peak (site activities), weekend peak (site activities) and overnight situations (HGV movements in service yards only).

Table 13 : Operational Noise Levels – All on site noise as modelled

Noise Sensitive Receptor location	Period	Cumulative BS4142 “Specific Level” in dB(A)	Cumulative BS4142 “Rating Level” in dB(A)	Measured Background L _{A90} noise levels	‘Rating ‘Background Level’ and BS4142 Conclusion
1	Weekday PM peak	45	45	65	-20
	Weekend Peak	47	47	65	-18
	Night-time	14	14	52	-38
2	Weekday PM peak	50	50	49	+1
	Weekend Peak	52	52	49	+3
	Night-time	9	9	38	-29
3	Weekday PM peak	41	41	59	-18
	Weekend Peak	45	45	59	-14
	Night-time	15	15	40	-25
4	Weekday PM peak	40	40	50	-10
	Weekend Peak	42	42	50	-8
	Night-time	Commercial property – Daytime assessment only			
5	Weekday PM peak	48	48	49	-1
	Weekend Peak	51	51	49	+2
	Night-time	38	38	43.	-5
6	Weekday PM peak	57	57	54	+3
	Weekend Peak	61	61	54	+7
	Night-time	30	30	49	-19

It can be seen from the table above that the BS4142 assessment indicates that noise as a result of the proposed development (from HGV movements, the service yard, car park and access roads) would be rated by the standard as:

Weekday PM Peak - between +3 above and -20 dB below the existing background noise climate of the area. This would be considered by the standard to be of “*less than marginal significance*” with the resulting potential for complaints being considered to be low.

With regard to the potential assessment result of +3dB(A), this occurs at location 6 which is representative of the properties along Rathbone Road. As a worst case the assessment location within the model has been placed at the front of the row of terraced properties (numbered 288 – 298 Rathbone Road) located directly opposite the leisure undercroft access road and as such it would be extremely difficult to reduce this assessment result any further. However, property numbers 288 – 298 front directly onto the pavement of Rathbone Road, and as such have no exposed external living space that would be significantly adversely affected.

Weekend Daytime Peak - between +7 above and -18 dB below the existing background noise climate of the area. This would be considered by the standard to be of less than to “*marginal significance*”.

Again, as with the weekday PM peak, the +7dB(A) result is associated with the Leisure undercroft access road and there is no opportunity to screen these properties from the noise from this site road.

Overnight Operations - between -1 and -38 dB below the existing background noise climate of the area. This would be considered by the standard to be of “*less than marginal significance*” with the resulting potential for complaints being considered to be low.

5.1.4 Comparison to BS8233 Guidance Internal Noise Levels

As a result of the qualification within the BS4142 document that it is not a suitable methodology for assessing noise within buildings, reference has been made to the guidance of BS8233 with regard to internal noise levels during the overnight period. BS8233 contains guidance on internal noise levels for spaces in dwellings and other buildings which is summarised within Section 2.2.3 of this report.

In order to assess internal noise levels as a result of the proposed development alone they must first be predicted. It is stated in PPG24 that an open window (regardless of specification) offers between 10 and 15 dB of noise insulation. This is generally taken to be a conservative 13 dB. Based on this assumption internal noise levels in buildings at each receptor location can be predicted.

Table 14 below details predicted external façade noise levels at first floor height, which has been considered to be representative of upper floor bedroom windows. It is considered that within the scope of this assessment it would be more appropriate to reference first floor levels, as generally speaking bedrooms tend to be located on upper floors and the effectiveness of any screening measures proposed within the scope of the development could be reduced as a result of smaller path differences. It is therefore noted that the data presented within Column 2 of Table 14 below is not directly comparable with the information presented within Table 13 which relates to ground floor levels for the external assessment.

Table 14 presents internal noise levels associated with the highest development generated noise levels during the night-time period when people would be inside properties rather than outside. The ‘Good – 30dB(A)’ and ‘Reasonable – 35dB(A)’ criteria of BS8233 are included for comparison. It is noted, however, that the data presented within Column 2 of Table 14 below is as predicted at first floor level so as to be representative of potential upper floor bedrooms.

Location 4 has not been assessed within the table below as this is representative of the Wavertree Technology Park which we would not consider sensitive during the overnight period:

Table 14 : BS8233 Assessment

Location/Period	Façade corrected Predicted External noise Level in dB (Predicted L_{Aeq} + 3dB(A))	Predicted Internal noise level in dB L_{Aeq}	BS8233 ‘Good/Reasonable’ Conditions in dB L_{Aeq}
1 Night-time	20	7	30 “Good”
2 Night-time	15	2	30 “Good”
3 Night-time	20	7	30 “Good”
4 Night-time	Not considered sensitive overnight due to usage.		
5 Night-time	48	35	35 “Reasonable”
6 Night-time	34	21	30 “Good”

* Location 4 represents existing commercial operations as such night-time levels are not appropriate

It can be seen from the table above that first floor overnight internal noise levels in residential dwellings at the identified receptor locations as a result of the proposed development alone would not breach of the ‘Reasonable’ criteria of 35dB(A) from within BS8233, and in most cases can be seen to be below the more stringent ‘Good’ design range criteria level of 30dB(A).

The assessment presented above within **Table 14** : BS8233 Assessment only concerns noise generated by the development alone and does not consider the

existing levels of noise within nearby sensitive receptors resulting from other sources in the area.

5.2 Assessment of the land set aside for Residential Development

Within the scope of the development proposals is provision for a very small residential development allocation located on a plot of land off Mill Lane to the north of Edge Lane Drive and also to the rear of the Robins and Day Peugeot Garage again adjacent to Mill Lane. The latter development, adjacent to the Peugeot Garage is considered within the scope of a separate Mouchel noise assessment report reference 1025014/V003/100913.

Noise levels in the vicinity of this aspect of the development are represented by the data amassed at monitoring location MP8, presented within **Table 15** : below.

Table 15 : Noise monitoring results at location 8

Location	Date	Start time	Run duration (hh:mm:ss)	Statistical Parameters in dB(A)		
				L_{eq}	L_{90}	L_{max}
8	04/12/09	12:22	00:60:00	61.3	53.9	77.4
		13:22	00:60:00	62.2	55.0	85.1
		14:22	00:60:00	62.1	55.0	82.4
	08/12/09	03:34	00:30:00	54.6	42.7	71.4

The development as proposed seemingly consists of approximately 6 units fronting onto Mill Lane and backing onto the Finchley Special School.

Assessment of the suitability of the proposed plot of land for residential usage would be undertaken in line with the Noise Exposure Category (NEC) methodology of PPG24 and be based upon the existing measured traffic noise levels within the area. As a result of the nature of the noise climate in the vicinity of the proposed residential development it is considered that an indication of the 16hr daytime L_{Aeq} can be suitably calculated from a 3hr L_{A10} level following the process as detailed below.

The 3 hr L_{A10} value as measured can be corrected to an 18hr L_{A10} following the methodology as detailed within the Calculation of Road Traffic noise (paragraph 43). This 18hr L_{A10} can then be further corrected to a 16hr L_{Aeq} following the methodology of PPG24 (Annex 2 paragraph 7). The methodology followed to derive a 16hr L_{Aeq} for use within the PPG24 NEC assessment is as detailed below:

$$\text{CRTN correction to } L_{10(18hour)} = L_{10(3hour)} - 1$$

$$\text{PPG24 correction to } L_{Aeq(16hour)} = (L_{10(18hour)} - 3) + 1$$

The measured 3 hour L_{10} value at Location 8 is 62dB(A). This $L_{A10, 3hr}$ has then been corrected to an $L_{eq, 16hr}$ following the above detailed protocol resulting in a free field noise level of 59dB(A). This value has then been compared to the PPG24 Noise

Exposure Category (NEC) assessment scheme for new residential development detailing that during the daytime period the proposed residential development site would be within **PPG24 NEC B**, detailing that “*Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise*”.

Furthermore reference to **Table 20** of Section 6.6 relating to the potential increases in future noise levels as a result of vehicle movements associated with the proposed development concludes the following. As a whole in the area of the proposed residential development traffic noise levels are expected to increase by no more than 1dB(A) as a result of the scheme, Simple correction of the calculated 16hr L_{Aeq} level to take account of noise associated with the future operation of the Retail and Leisure Park, would still be within **NEC B** for the daytime period.

During the overnight period noise levels were quantified at Location 8 between 03:30 and 04:00 hours, during this time the $L_{eq, 30min}$ was measured to be approximately 55dB(A). To give an indication of the suitability of the proposed site for residential development during the overnight period this level have been compared to the PPG24 NEC classification scheme detailing that the proposed site would also be within **NEC B** during the overnight period.

5.2.1 *Mitigation Measures associated with the residential development*

As a result of the PPG24 classification of the proposed development site being **NEC B** it is apparent that mitigation measures would need to be considered within the detailed design of the development to ensure that suitable noise levels are achieved.

At the current time the details of the proposed design and layout of the residential aspect of the development is not sufficiently detailed to enable a full assessment of noise mitigation measures to be undertaken. The following information is therefore given as an indication of the measures that could be implemented following further consideration.

- *Site Design Layout*

The design of the site should be such to ensure that any external living areas (gardens and balconies) are positioned to the rear of the buildings and not overlooking Mill Lane or Edge Lane.

Within the scope of the internal design of the residential building structures provision should be made to, as far as possible, position none noise sensitive rooms such as kitchens, hall ways, stairs and bathrooms on facades adjacent to Mill Lane.

Within the scope of the building design care should be taken to ensure that window dimensions are suitably controlled to ensure that appropriate façade attenuations can be achieved.

- *Glazing Specification*

Suitable double glazing should be specified within the development to ensure that appropriate internal noise levels from within BS8233 are achieved.

Assuming that a partially open window offers approximately 13 dB attenuation it is apparent that based upon the quantified noise levels during the daytime ($59 \text{ dB}_{L_{Aeq, 16hr}}$) and night-time ($55 \text{ dB}_{L_{Aeq, 30mins}}$) periods, additional mitigation would be required to ensure suitable internal noise levels are achieved within this aspect of the development.

It has been assumed appropriate to reference the guidance of BS8233 with respect to suitable internal noise levels within certain aspects of the residential development. **Table 16** below details the required level of mitigation within the development to achieve the referenced BS8233 criteria.

Table 16 : Internal noise level assessment –Residential Development

Assessment Period	Room Description	Internal BS8233 design criteria	External Façade corrected noise levels*(1)	Required façade attenuation in dB
Daytime	Living rooms, studies bedrooms	Good – $30 \text{ dB}_{L_{Aeq}}$	63	33dB
		Reasonable – $40 \text{ dB}_{L_{Aeq}}$	63	23dB
Night-time	Bedrooms	Good – $30 \text{ dB}_{L_{Aeq}}$	58	28dB
		Reasonable – $35 \text{ dB}_{L_{Aeq}}$	58	23dB
		Reasonable – $45 \text{ dB}_{L_{Amax}}$	88	43dB

*(1) – The external façade noise levels have been calculated from the external measured/corrected noise levels with the addition of a 3 dB(A) façade correction.

Reference to **Table 16** above concludes that the required levels of façade attenuation should be comfortably achieved with the provision of a suitable acoustic double glazed unit (R_{TRA} Attenuation) within a basic block-work (110mm Brick, 100mm brown fibre filled cavity, 100mm dense block, 12.5mm plaster board - $51 \text{ dB}_{R_{TRA}}$ attenuation) construction. The exact specification of the appropriate glazing could not be concluded until the dimensions of the window unit and habitable rooms are defined. Therefore, this would require to be verified once the specifics of the dwelling design, window locations and dimensions and façade construction specifications are concluded.

However, in order provide justification that façade attenuation in the region of that specified above can be achieved, the following information is presented: The

composite façade attenuation values presented within **Table 17** : Composite façade calculations below are based upon a typical external room façade dimension of 3mx2.8m and a window portal of 1.5mx1.0m within that façade, and assume acoustic trickle ventilation accounting for an area of 0.2m² with an R_w of 41dB(A).

Table 17 : Composite façade calculations

Wall Construction	R _{TRA} of Wall Construction	Window Specification	R _{TRA} of Glazing specification	Calculated Composite Façade Attenuation
110mm Brick, 100mm cavity, 100mm dense block, 12.5mm plaster board	51dB	10/12/6.4 _{PVB}	34dB	41.1dB
		10/12/16	37dB	43.7dB

Due to the level of attenuation required to be achieved by façades within the proposed residential development, alternative forms of ventilation would be required within the scope of the building design to remove the necessity to open windows for ventilation. This could be provided for by the use of acoustic trickle ventilation conforming to the type as specified in the Noise Insulation Regulations, or by means of a whole building system via internal duct work venting onto the opposite façade of the building from the noise source.

Should the final development scheme include a whole building system venting onto the opposite quieter façade, the associated duct work, and any associated fans, would require being adequately treated and silenced to prevent mechanical noise becoming an issue within any of the connected rooms.

5.2.2 Additional Information

The attenuation values presented within the scope of this report assume that all windows and ventilation systems would be well sealed and fitted with workmanship of good quality. Poorly fitting windows and build quality can significantly decrease the sound insulation performance of building elements..

It should be noted that the glazing specifications provided above are for acoustic purposes only and, therefore, any structural, safety or other issues will require to be addressed separately.

A detailed acoustic assessment would be necessary within the design of the residential properties to ensure that façade constructions are wholly appropriate to ensure that suitable internal noise levels are achieved. In addition, acoustic design work should be completed to ensure that a suitable level of sound insulation is achieved between dwellings as defined within The Building Regulations 2000: Approved Document “E” – Resistance to the passage of Sound. This could be set as a condition attached to any planning consent to develop the site.

5.3 Assessment of the land set aside for the Rathbone Hospital Extension

The area of land occupied by the derelict building and hard standing of the former Ian Skelly car dealership and the Carpet world retail complex have been set aside within the development proposals for an extension to the existing Rathbone Hospital.

Within the scope of the hospital extension it is proposed to erect in the region of 6 multi story buildings housing undefined clinical and clerical areas. It is the understanding of the Author that the hospital extension would be the subject of a separate detailed planning application. Therefore within the scope of this document only basic discussion will be opened looking into the general suitability of the area for the proposed usage. As such, within the scope of the separate planning application and the later detailed design the hospital facilities noise and acoustic issues would require to be considered in detail in order that the development wholly conform to the appropriate standards.

Within the scope of the assessment undertaken it is considered that the noise levels monitored at locations MP1, 6 and 7 would be representative of noise levels likely to be incident on the proposed hospital extension buildings. Location 1 has been selected as being representative of noise levels on façades directly adjacent to Edge Lane, with locations 6 and 7 being representative of the rear of the hospital site. The measured data for these locations, forming the basis of this assessment, is as presented below within **Table 18**:

Table 18 : Monitored noise level data at locations 1 and 5

Location	Date	Start time	Run duration (hh:mm:ss)	Statistical Parameters in dB(A)		
				L _{eq}	L ₉₀	L _{max}
Daytime measured noise levels						
1	04/12/09	16:07	00:60:00	71.1	65.0	90.9
		17:07	00:27:00	75.9	65.2	100.1
6	04/12/09	14:16	00:60:00	61.7	54.9	88.3
		15:16	00:30:00	60.6	54.3	76.0
7	04/12/09	12:52	00:60:00	68.2	56.9	90.9
		13:52	00:15:00	67.7	56.9	79.9
Night-time measured noise levels						
1	08/12/09	02:23	00:30:00	66.9	52.0	82.3
6	08/12/09	00:28	00:30:00	56.0	49.3	74.5
7	08/12/09	23:59	00:25:00	60.4	47.7	77.1

From the analysis of the data amassed at these locations it is clear that in order to achieve appropriate internal noise levels as defined within the HTM 08-01 design document façade mitigation would be required.

The level of this mitigation would depend upon the usage class of the space be it an office, single bed ward, theatre etc. **Table 19** below presents details of the level of

façade mitigation required as a maximum based upon the existing noise climate of the area in order to achieve the required acoustic design criteria of the HTM 08-01 document. The data presented within **Table 19** below is based upon the worst case highest measured noise levels quantified at Location 1 representative of the most exposed façades adjacent to Edge Lane.

Table 19 : Internal noise level assessment – Hospital Extension Development

Assessment Period	Room Description	Internal HTM 08-01 design criteria	External Façade corrected noise levels*(1)	Required façade attenuation in dB
Daytime	Single-bed and Multi-bed wards, recovery areas and on-call room, relatives' overnight stay	40 $L_{Aeq, 1hr}$ day	78.9	38.9dB
	Clerical office Space (BS8233 criteria)			
Night-time	Single-bed and Multi-bed wards, recovery areas and on-call room, relatives' overnight stay	35 $L_{Aeq, 1hr}$ night	69.9	34.9dB
		45 $L_{Amax, f}$ night	85.3	40.3dB
Anytime	A&E	45 $L_{Aeq, 1hr}$	78.9	33.9dB
	Corridors, hospital street, atria	55 $L_{Aeq, 1hr}$	78.9	23.9dB
	Dining areas, waiting areas, playrooms	50 $L_{Aeq, 1hr}$	78.9	28.9dB
	Operating theatres	40 $L_{Aeq, 1hr}$	78.9	38.9dB
		50 $L_{Amax, f}$	103.1	53.1dB

*(1) – The external façade noise levels have been calculated from the external measured/corrected noise levels with the addition of a 3dB(A) façade correction.

The level of attenuation required to be achieved by the external façades of the building structures should be easily achieved with appropriately specified and fitted glazing within a relatively standard envelope construction (110mm external brick façade, 100mm Brown Fibre filled Cavity, 100mm dense block-work and 12.5mm plaster board internal face (approximate R_{TRA} of 51dB, R_w of 59dB)). However, the exact specifics of the glazing specification required could not be confirmed until the building layout design is confirmed detailing internal space, façade and window locations and dimensions.

With regard to the relatively high level of attenuation required in association with the L_{Amax} limits for any operating theatres it is considered that appropriate placing of these areas away from Edge Lane coupled with the fact that these areas would not typically contain provision for windows would mean that appropriate internal levels could be met. As demonstrated within the paragraph above a relatively standard block-work construction can provide R_w sound reduction levels in the region of 59dB. Provision of more specific construction measures including acoustic products could further increase this attenuation if and where required. Furthermore on façades away from Edge lane noise levels are shown to be lower and increased screening attributable to the building structures of the hospital would further aid to reduce noise levels on façades to the rear of the site or sheltered façades.

Due to the level of attenuation required to be achieved by the façades within the proposed hospital overlooking Edge Lane alternative forms of ventilation would be required to be specified within the scope of the building designs to remove the necessity to open the windows for ventilation. This could be provided for by the use of acoustic trickle ventilation conforming to the type as specified in the Noise Insulation Regulations, or by means of a whole building system via internal duct work venting onto the opposite façade of the building from the noise source.

Should the final development scheme include a whole building ventilation system venting onto the opposite, sheltered façade, the associated duct work, and any associated fans, would require being adequately treated and silenced to prevent mechanical noise becoming an issue within any of the connected rooms. This would be considered within the M&E section of the design of the hospital.

Reference to **Table 19** above concludes that the required levels of façade attenuation detail that significant thought requires to be put into the acoustic design of the external facades of the hospital development, particularly overlooking Edge Lane, in order to ensure that suitable internal levels are achieved. This would require to be verified once the specifics of the hospital design, window locations and dimensions, façade construction specifications and room layouts are concluded. However, the required sound insulation performance of the proposed hospital building facades could be reduced by ensuring sensitive spaces do not overlook the main noisy sources.

5.3.1 *Additional Information*

A detailed acoustic assessment would be necessary within the separate planning application and design of the hospital facility to ensure that façade constructions, ventilation strategy, internal sound insulation etc. are wholly appropriate to ensure that the acoustic requirements as defined within HTM 08-01 and by the client are entirely met.

5.4 **Assessment of the land set aside for the Rathbone Park**

The land set aside for the replacement Rathbone Park public open space located to the rear of the Robins and Day Peugeot Garage is also considered within the scope of a separate Mouchel noise assessment report reference 1025014/V003/100913.

In order to maximise the potential of the redesigned Edge Lane Central Retail and Leisure Park it was necessary to develop over the Rathbone Park. As such, within the scope of the proposals it is necessary to replace the facilities removed with the loss of the park.

It is proposed to develop an area of public open space on land behind the Robins and Day Peugeot Garage represented within the surveys by monitoring location MP07.

In order to assess the suitability of the area for public open space reference will be made to the recommendations of the WHO guidelines for community noise. Within this document it is recommended that a noise level of 55dB(A) L_{Aeq} is appropriate to prevent the majority of people from being annoyed by noise. This level is therefore considered to be an appropriate noise target with regard to a park area.

The measured L_{Aeq} at monitoring location 7, representative of the closest extent of the park to Edge Lane Drive is shown to be at a level of 68.2dB which is above the WHO recommended level of 55dB(A). However, it is not considered that noise levels within the proposed location for the park would be significantly different to that experienced within the existing location. In fact, due to the increased separation distance from the main noise source of the area, Edge Lane, it would be reasonable to consider that noise levels within the proposed park location would be somewhat lower than those within the existing park.

In addition, the measured noise levels of 68.2 dB L_{Aeq} are at the closest position of the proposed public space to the main noise source of Edge Lane, noise levels over the majority of the proposed space would be reduced due to increased distance.

5.5 Noise from Vehicles on Surrounding Roads

Within the scope of the Highways assessment undertaken by Sanderson Associates Consulting Engineers only Peak hour information has been assessed. Based on these peak hour traffic flows as supplied calculations have been undertaken to conclude the percentage increase in traffic flows on a number of the most affected routes around the site.

Information supplied by Sanderson Associates relating to percentage HGV content and speed limits concludes that there are no expected changes in either. Therefore assuming all other factors remain the same the increase in noise due to the changes in traffic flow with and without out the Edge Lane Central development can be relatively simply predicted.

The following table details the predicted change in noise levels due to the altered traffic flows following the full opening of the development in 2016: The data supplied by Sanderson Associates relates to AM, PM and Weekend Peak flows for the year 2019 and the assessment presented below is based around these figures.

Table 20 : Daytime Traffic Noise Level Changes

Noise Sensitive Receptor location	Peak Period	Traffic Flows		Percentage increase in Total Traffic Flow due to the Development in 2020 (rounded to full %)	Predicted Change in Noise Level (dB) as a result of traffic associated with the Development in 2020	Sensitivity of receptors adjacent to the road under consideration
		Pre development (2020)	Post development (2020)			
Edge Lane east of Mill Lane towards the M62 Motorway	Weekday AM	4630	4768	3%	<1dBL _{A10, 1hr}	High - Residential
	Weekday PM	4249	4635	9%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	3267	3926	20%	<1dBL _{A10, 1hr}	
Edge Lane between Mill Lane and Rathbone Rd.	Weekday AM	4434	4589	3%	<1dBL _{A10, 1hr}	High - Residential and Rathbone Hospital Extension
	Weekday PM	4009	4448	11%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	3415	4189	23%	<1dBL _{A10, 1hr}	
Edge Lane between Rathbone Rd and the ELCRP entrance*	Weekday AM	3434	3589	5%	<1dBL _{A10, 1hr}	High – residential Low – Commercial and Industrial
	Weekday PM	3325	3813	15%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	3190	4081	28%	1.1dBL _{A10, 1hr}	
Edge Lane between ELCRP entrance* and Milton Rd/West Bank Road	Weekday AM	3180	3301	4%	<1dBL _{A10, 1hr}	High – residential Low – Commercial and Industrial
	Weekday PM	2865	3342	17%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	2727	3601	32%	1.2dBL _{A10, 1hr}	
Edge Lane between Milton Rd/West Bank Road and Laurel Rd	Weekday AM	3057	3173	4%	<1dBL _{A10, 1hr}	High - Residential and Birchfield County Primary School
	Weekday PM	3144	3621	15%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	2864	3738	31%	1.2dBL _{A10, 1hr}	
Edge Lane West of Laurel Rd towards Liverpool City Centre	Weekday AM	2808	2911	4%	<1dBL _{A10, 1hr}	High - Residential
	Weekday PM	2819	3226	14%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	2397	3113	30%	1.1dBL _{A10, 1hr}	
Mill Lane between Edge Lane and the Rathbone Hospital entrance	Weekday AM	1374	1405	2%	<1dBL _{A10, 1hr}	High – Rathbone Hospital Extension Low – Commercial
	Weekday PM	1305	1372	5%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	999	1132	13%	<1dBL _{A10, 1hr}	
Mill Lane between the Rathbone Hospital entrance and Binns Rd	Weekday AM	1374	1408	2%	<1dBL _{A10, 1hr}	High – Rathbone Hospital, public open space and residential
	Weekday PM	1305	1370	5%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	999	1132	13%	<1dBL _{A10, 1hr}	
Binns Road between Mill Lane and Rathbone Rd	Weekday AM	486	494	2%	<1dBL _{A10, 1hr}	High - Residential and Rathbone Hospital
	Weekday PM	547	553	1%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	235	243	3%	<1dBL _{A10, 1hr}	

Noise Sensitive Receptor location	Peak Period	Traffic Flows		Percentage increase in Total Traffic Flow due to the Development in 2020 (rounded to full %)	Predicted Change in Noise Level (dB) as a result of traffic associated with the Development in 2020	Sensitive receptors adjacent to the road under consideration
		Pre development (2020)	Post development (2020)			
Rathbone Road between Edge Lane and the Leisure complex entrance	Weekday AM	1937	1974	2%	<1dBL _{A10, 1hr}	High - Residential and Rathbone Hospital Low - commercial
	Weekday PM	1671	1748	5%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	1454	1670	15%	<1dBL_{A10, 1hr}	
Rathbone Road between the Leisure complex entrance and Binns Road	Weekday AM	1937	1964	1%	<1dBL _{A10, 1hr}	High - Residential
	Weekday PM	1671	1749	5%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	1454	1669	15%	<1dBL_{A10, 1hr}	
Rathbone Road south of Binns Road	Weekday AM	2442	2468	1%	<1dBL _{A10, 1hr}	High – residential Low – Commercial Garage
	Weekday PM	2223	2307	4%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	1542	1766	15%	<1dBL_{A10, 1hr}	
St Oswald Street north of Edge Lane	Weekday AM	1976	2011	2%	<1dBL _{A10, 1hr}	High - Residential
	Weekday PM	2187	2314	6%	<1dBL _{A10, 1hr}	
	Weekend (Sat)	2256	2590	15%	<1dBL_{A10, 1hr}	
Milton Road to Units A-D car park entrance south of Edge Lane	Weekday AM	77	140	82%	2.6dBL _{A10, 1hr}	Low – Industrial or commercial
	Weekday PM	126	510	305%	6.1dBL _{A10, 1hr}	
	Weekend (Sat)	77	881	1044%	10.6dBL_{A10, 1hr}	
Binns Road from Units A-D car park entrance to Crawford Way south of Edge Lane	Weekday AM	277	340	23%	<1dBL _{A10, 1hr}	Low – Industrial or commercial
	Weekday PM	217	601	177%	4.4dBL _{A10, 1hr}	
	Weekend (Sat)	120	838	598%	8.4dBL_{A10, 1hr}	
Crawford Way between Binns Road and Pigue Lane	Weekday AM	422	550	30%	1.2dBL _{A10, 1hr}	Low – Industrial or commercial
	Weekday PM	550	1010	84%	2.6dBL _{A10, 1hr}	
	Weekend (Sat)	435	1153	165%	4.2dBL_{A10, 1hr}	
Pigue Lane east of Crawford Way	Weekday AM	385	**	**	**	Low – Industrial or commercial
	Weekday PM	481	**	**	**	
	Weekend (Sat)	375	**	**	**	

Noise Sensitive Receptor location	Peak Period	Traffic Flows		Percentage increase in Total Traffic Flow due to the Development in 2020 (rounded to full %)	Predicted Change in Noise Level (dB) as a result of traffic associated with the Development in 2020	Sensitive receptors adjacent to the road under consideration
		Pre development (2020)	Post development (2020)			
Pigue Lane west of Crawford Way	Weekday AM	441	**	**	**	Low – Industrial or commercial
	Weekday PM	536	**	**	**	
	Weekend (Sat)	341	**	**	**	

Notes

* - Edge Lane Central Retail Park (ELCRP) entrance is formerly Montrose Way

** - No Proposed “with development” Traffic Generation data available for these locations

Table 20 above shows that noise level increases as a result of changes in traffic flow during the daytime period in the main are of less than 1 dB(A) but in some instances around the site entrances could be up to 10.6 dB(A).

However, it is noted that in the main routes in the vicinity of the proposed development with High sensitivity (Hospitals, residential, schools etc) buildings and land uses adjacent (identified within **Table 20**) are subject to increases in noise level due to road traffic noise of approximately 1 dB(A) $L_{eq,1hr(peak)}$ or less.

With regard to routes showing increases in noise of greater than 2 dB(A) $L_{eq,1hr(peak)}$ these are noted to be those routes outside of the immediate vicinity of any sensitive buildings or land uses, running through Low sensitivity industrial or commercial settings (identified within **Table 20**).

It is stated in DMRB HA213/08 that a change of 1 dB(A) in the short-term (e.g. when a project is opened) is the smallest that is considered perceptible, whilst in the long term 3dB(A) is considered perceptible and should be mitigated if possible.

DMRB also contains the following table with regard to the impact of changes in noise level due to traffic levels:

Table 21 : DMRB Magnitude of Noise Impacts

Noise Change, LA10, 18h	Magnitude of Impact
0	No change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

Based on the information within **Table 20** and the semantic impact assessment scheme presented within **Table 21** above, it is concluded that with regard to routes running through High sensitivity areas and uses the predicted increase in noise levels as a result of road traffic generated by the proposed Edge Lane Central Retail and Leisure Park would be of **Negligible to Minor** in nature.

Impacts of **Moderate to Major** could also be experienced along certain routes being used as access routes, but these impacts would not occur along any routes adjacent to any noise sensitive properties or land uses.

5.6 Existing Noise Sources

It is also important to note that the area surrounding the proposed development site contains a number of existing industrial/commercial type operations akin to those within the proposed development. Therefore, noise sensitive receptors, such as those selected and considered within the scope of this assessment, are already exposed to noise of an industrial/commercial nature including HGV movements and plant noise, similar to that proposed, within the current noise climate.

It is therefore unlikely that the operation of the proposed development would impact significantly on the existing noise 'character' of the area. As such the subjective impacts of any noise generated by operations within the proposed development site are likely to be reduced by a masking effect of the existing noise climate.

6 Conclusions

A noise assessment has been completed for the proposed Edge Lane Retail and Leisure Park, to be submitted to Liverpool City Council, in support of a planning application to develop the site. The development as proposed includes provision for retail units, relocated industrial units, food outlets, leisure activities, a hospital extension, public open space and a small quantity of residential buildings.

A noise survey has been completed to quantify the existing noise climate at various noise sensitive receptors around the proposed development site as agreed with Liverpool City Council Environmental Protection Unit. However, due to site specific issues and revisions to the proposed site detail some variation occurred during the monitoring survey.

6.1 Static, Fixed Plant

At this stage of the design process there is no data available for any static noise generating plant, such as air conditioning or refrigeration equipment, associated with the development. As such, to control noise from plant it is recommended that appropriate conditions be attached to any planning permission. Suitable plant noise emission limits have been suggested within **Section 4.2.2** of this report.

6.2 Industrial Operations

With regard to the industrial aspects included within the proposed scheme, as end users are not yet identified it is impossible to accurately and reliably predict the noise impact at any nearby noise sensitive receptors. It is therefore also considered that this aspect of the development could also be controlled by a suitable worded planning condition. Information relating to this aspect of the development is contained within **Section 4.2.3** of this report.

6.3 Commercial and Leisure Aspects

A noise model has been created to predict the likely level of noise incident on sensitive receptors close to the site due to the operation of key aspects of the proposed development (HGV movements, service yard operations, car parks and car access). In addition changes in noise level on surrounding roads have been predicted based on supplied pre and post development peak hour traffic flow information.

When assessed in accordance with BS4142 'Method for Rating Industrial Noise Affecting mixed Residential and Industrial Areas' It has been found that noise is of '*marginal significance*' or less at all assessed noise sensitive receptors and the assessment does not indicate that complaints, as a result of the operation of the proposed development, would generally be expected to occur.

However, in order to achieve this some level of inherent noise mitigation is necessary as detailed within **Section 4.3** of this report.

6.4 Off site Traffic noise Assessment

Increases in traffic noise on roads close to the site have been assessed against the values stated in the Highways Agency 'Design Manual for Roads and Bridges' document.

It has been found that certain main routes assessed in the vicinity of the development site would exhibit impacts of **Moderate** to **Major** as a result of the scheme. However, these routes are shown (as detailed in **Table 20** : Daytime Traffic Noise Level Changes) to be located within industrial and commercial areas which would not be considered to be significantly sensitive to noise (Low sensitivity).

With regard to routes located within close proximity of residential and sensitive receptor locations, impacts are shown to be of **Negligible** to **Minor** in nature.

6.5 Noise Sensitive Aspects (Residential and Hospital Extension)

Within the scope of the proposed development is provision for noise sensitive development, namely the residential and hospital extension aspects, is made.

With regard to both, it is considered that based upon the appropriate assessment methodologies and guidance (PPG24 and HTM 08-01 respectively) and subject to the implementation of suitable design measures within the construction of the building structures appropriate internal noise levels can be achieved.

However, with regard to both the residential and the hospital aspects of the development, due to the level of information available at the current time, further acoustic works would require to be undertaken within the detailed design stage of the projects to ensure that appropriate levels are achieved in practice.

6.6 Public Open Space

With regard to the public open space proposed within the scope of the development required as a replacement for the Rathbone Park the following is concluded.

Whilst the measured noise levels in the vicinity of the proposed park are in excess of the WHO guidelines value to prevent serious annoyance they are not considered to be dissimilar from the noise levels experienced within the current park. In fact due to the increased separation distance from Edge lane noise levels within the proposed park are likely to be somewhat lower than those experienced at the current park location.

6.7 General Conclusions

Due to the existing nature of the noise climate around the proposed site, it is not believed that noise generated by the proposed mixed use retail and leisure park development will be significantly out of 'character' for the area or result in significant negative impacts relating to noise.

7 References

Department for communities and Local Government Planning Policy Guidance Note 24, 1994

British Standards Institution. British Standard 4142: Rating Industrial Noise Affecting Mixed Residential and Industrial Areas, 1997.

British Standards Institution. British Standard 8233: Noise reduction and sound insulation for buildings – Code of practice', 1999.

British Standards Institution. British Standard 5228: Code of practice for noise and vibration control and open sirens – part 1 : Noise, 2009

Highways Agency 'Design manual for Roads and Bridges' Volume 11 Section 3 Part 7 HA 213/08 Noise and Vibration, 2008

Department of Health - Health Technical Memorandum (HTM) 08-01: Acoustics

International Organisation for Standardisation 9613 Acoustics – Attenuation of Sound during Propagation Outdoors, 1993

Parkplatzlärmstudie des Bayerischen Landesamts für Umweltschutz (Bavarian Parking Lot Study of the Bavarian department for Environmental Protection)

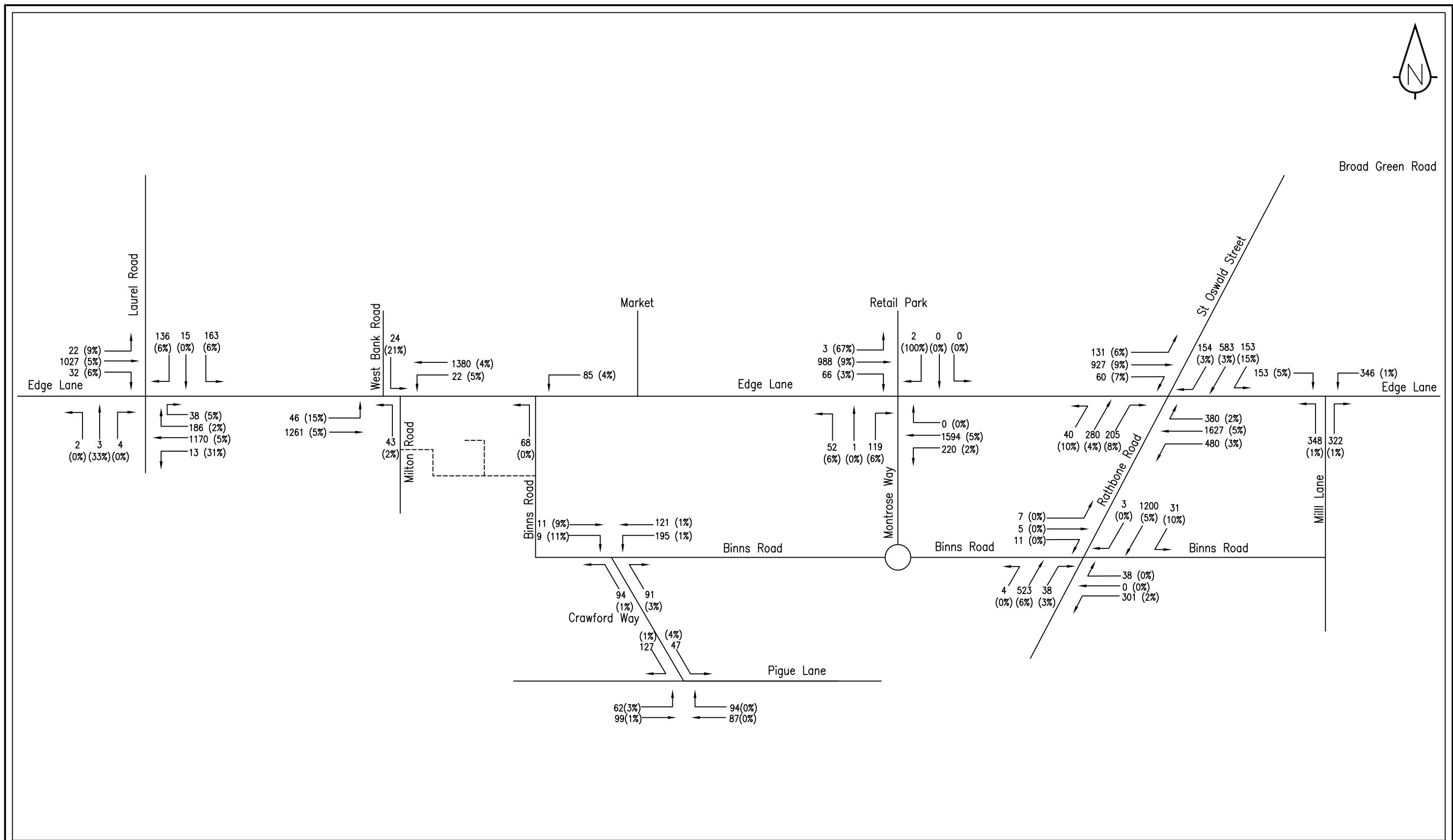
The Building Regulations 2000: Approved Document "E" – Resistance to the passage of Sound



World Health Organisation 'Guidelines for Community Noise' 1999

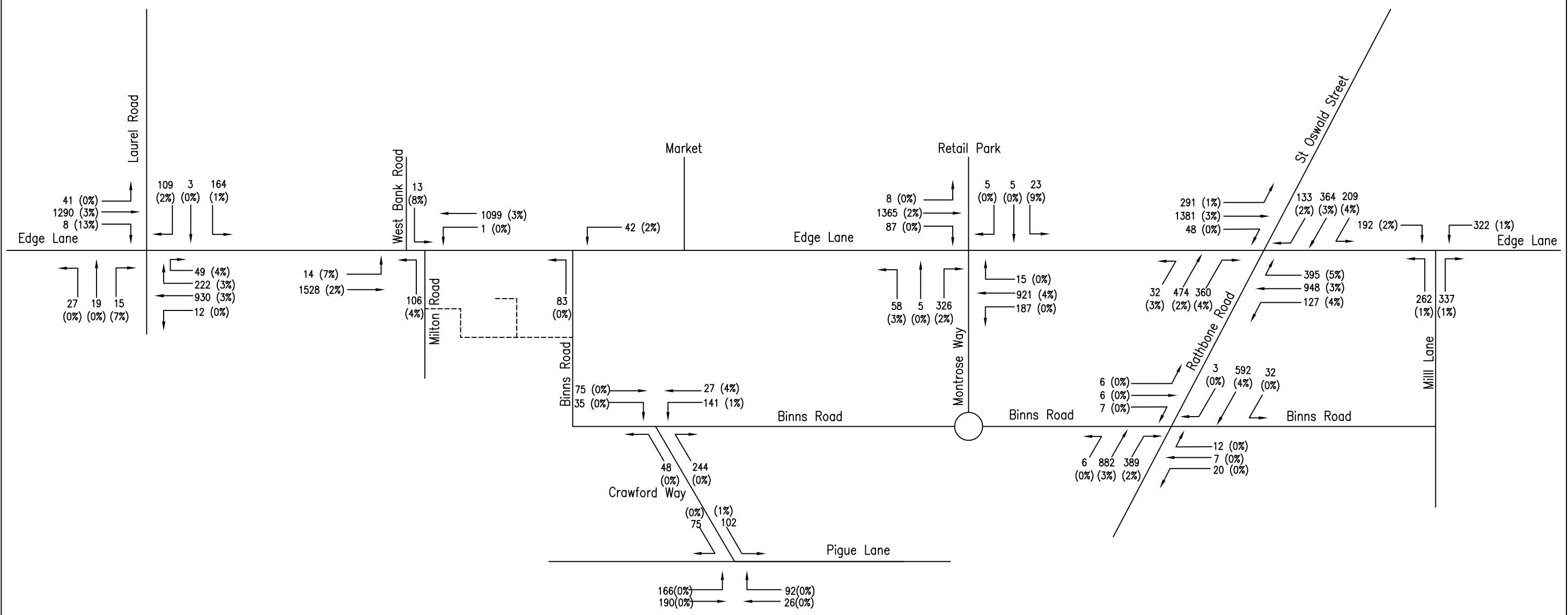
World Health Organisation Night Noise Guidelines for Europe' 2009

8 Appendices

Appendix 1 – Traffic Information



 <p>(consulting engineers) Ltd</p> <p>Highways Traffic Transportation Water</p> <p>T 01924 844080 mail@sandersonassociates.co.uk F 01924 844081 www.sandersonassociates.co.uk</p>	EDGE LANE, LIVERPOOL				Scale NTS		Drawn By AA	
					Drawing Size A3		Checked By MEW	
					Date MAY 2009		Approved By MEW	
							Drawing Number 5358 / FIGURE 65	
EXISTING TRAFFIC FLOWS AM PEAK 07.45 – 08.45 TOTAL VEHICLES WITH HGV%		Rev	Amendment	Drawn	Date	Checked	Rev	






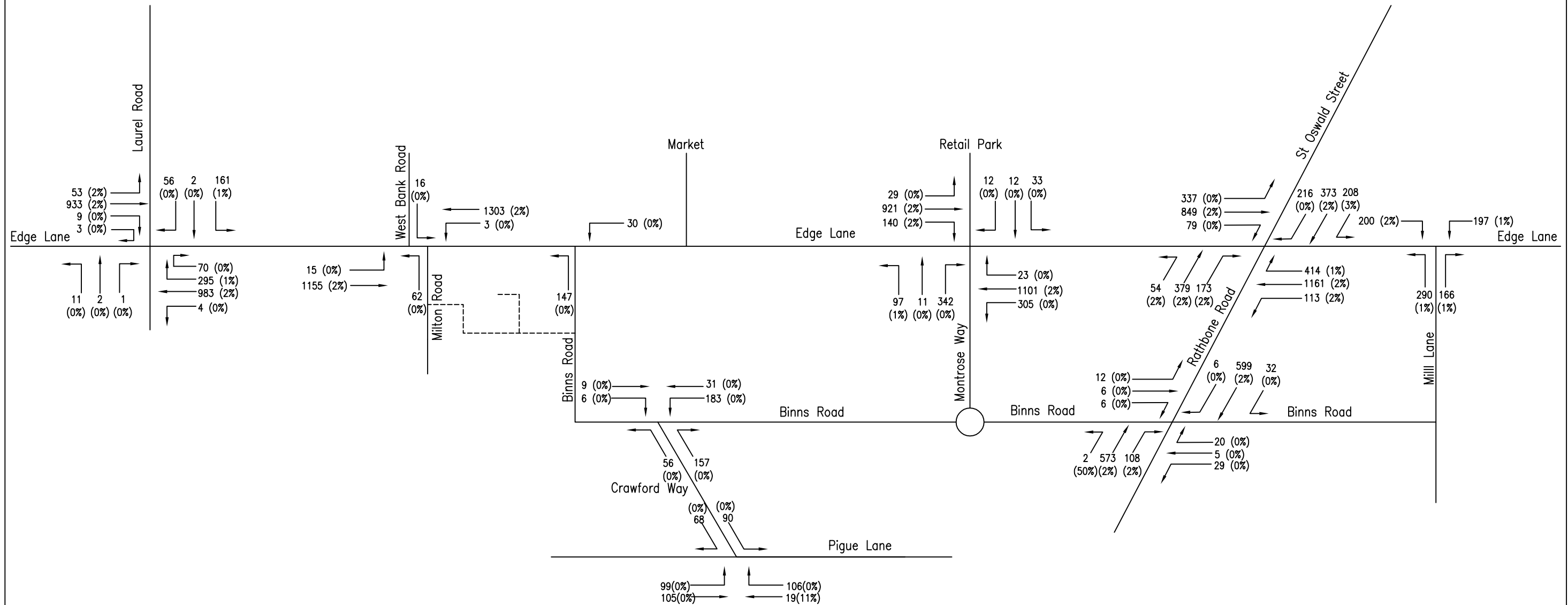
sanderson
associates
(consulting engineers) Ltd

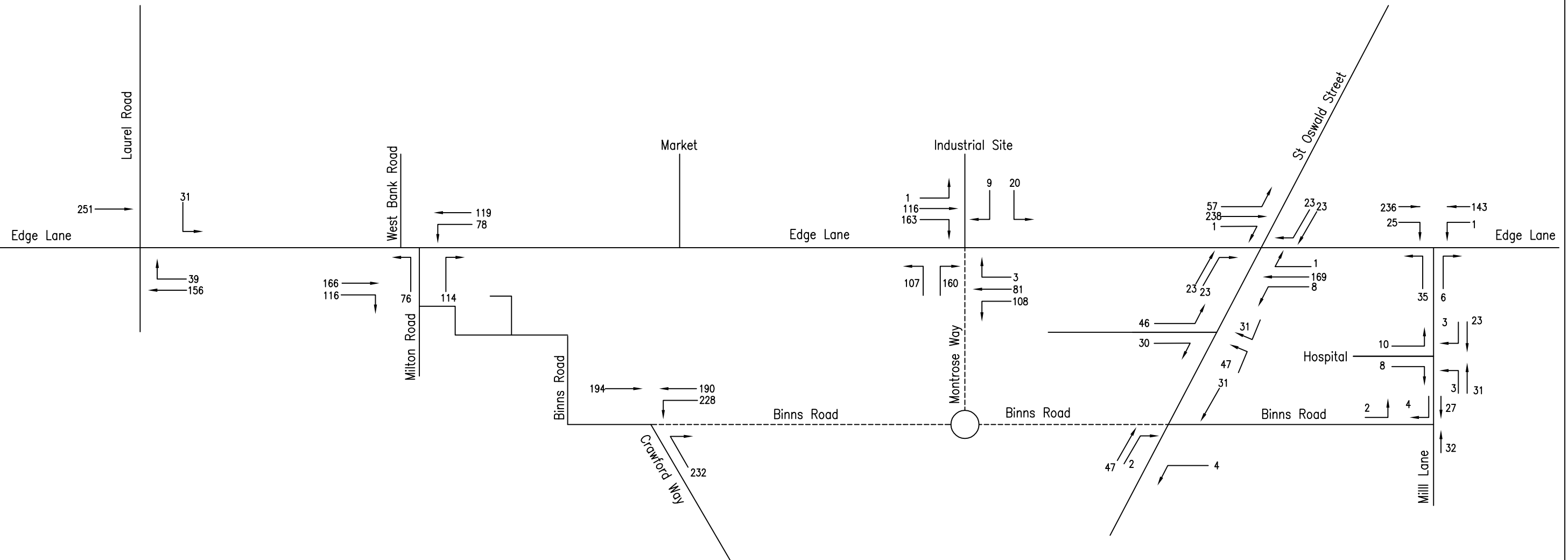
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EDGE LANE, LIVERPOOL		Scale NTS		Drawn By AA	
				Checked By MEW	
EXISTING TRAFFIC FLOWS PM PEAK 16.30 – 17.30 TOTAL VEHICLES WITH HGV%		Drawing Size A3		Date MAY 2009	
		Date MAY 2009		Approved By MEW	
				Drawing Number 5358 / FIGURE 66	
Rev	Amendment	Drawn	Date	Checked	Rev

FILE REF:





Appendix 2 – Equipment Calibration Certification



Certificate of Calibration

Certificate No.: U5625

CALIBRATION

0789

Test object : Sound Calibrator
Manufacturer: Norsonic
Type : 1251
Serial no: 31460

Customer: Mouchel Ltd
St. Johns House, Queen Street,
Manchester. M2 5JB
Will Neale

Order No: 901401 - 31460 - WN

Measurement Results:	Level	Level Stability	Frequency	Frequency Stability	Distortion
1:	114.11 dB	0.06 dB	1000.20 Hz	0.00 %	<0.30 %
2:	114.11 dB	0.06 dB	1000.19 Hz	0.00 %	<0.30 %
3:	114.13 dB	0.06 dB	1000.20 Hz	0.00 %	<0.30 %
Result (Average):	114.12 dB	0.06 dB	1000.20 Hz	0.00 %	<0.30 %
Expanded Uncertainty:	0.10 dB	0.02 dB	1.00 Hz	0.01 %	0.10 %
Degree of Freedom:	>100	>100	>100	>100	>100
Coverage Factor:	2.00	2.00	2.00	2.00	2.00

The stated level is relative to 20µPa.

The stated level is valid at reference conditions. The following correction factors have been applied during the measurement:

Pressure : 0.0005 dB/kPa Temperature : 0.003 dB/°C Relative humidity : 0.000 dB/%RH Load volume : 0.0003 dB/mm³

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level then the coverage factor is increased to maintain this confidence level. The uncertainty has been calculated in accordance with UKAS requirements.

Records : K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2009\NOR1251_31460_M1.nmf

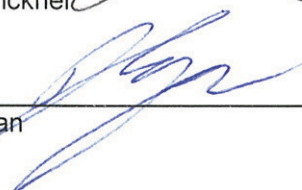
Environmental conditions:	Pressure :	Temperature :	Relative humidity :
Reference conditions:	101,325 kPa	23,0 °C	50 %RH
Measurement conditions :	101.057 ± 0.001 kPa	24.1 ± 1.0 °C	63.1 ± 3.7 %RH

Date received : 13/08/2009
Date of calibration: 14/08/2009
Date of issue: 14/08/2009

Engineer

Michael Tickner 

Supervisor

David Egan 

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full without the prior written approval of the issuing laboratory.

Calibration Report

Certificate No.:4131

Norsonic Type : 118 Serial no : 31786

Customer: Mouchel Ltd
Department: Acoustics
Place: St. John's House, Queen Street
City: Manchester, M2 5JB
Order No: Letter
Contact Person: Mr Mark Harrison
Phone/Mail:

Microphone :	Norsonic	Type : 1225	Serial no : 91775	Sens:-26.73dB
Pre amplifier	Norsonic	Type : 1206	Serial no : 30810	
Calibrator :	Norsonic	Type : 1251	Serial no : 31460	Level:114.08dB

Measured with Pre Amplifier Mains adapter was included
Microphone cable was included RS232 cable was included

This sound level meter has been calibrated as specified in BS 7580. PART 1 : 1997.

Measurement Results:

Noise test - BS 7580 #5.5.2	Passed
Level Linearity Test - BS 7580, #5.5.3	Passed
Frequency weightings: A Network - BS 7580 #5.5.4	Passed
Frequency weightings: C Network - BS 7580 #5.5.4	Passed
Time weightings F and S - BS7580 #5.5.5	Passed
Peak response - BS7580 #5.5.6	Passed
RMS accuracy - BS7580 #5.5.7	Passed
Time weighting I - BS7580 #5.5.8	Passed
Integrating Test : Time averaging - BS7580 #5.5.9	Passed
Integrating Test : Pulse range - BS7580 #5.5.10	Passed
Integrating Test : Sound exposure level - BS7580 #5.5.11	Passed
Overload SPL Test - BS 7580 #5.5.12	Passed
Overload Leq Test - BS 7580 #5.5.12	Passed
Acoustic tests - BS 7580 #5.4 and 5.6	Passed
Summation of acoustic tests - BS 7580 #5.5.4	Passed

The overall frequency response of the sound level meter including case reflections, microphone response and wind screen has shown to confirm with the requirements in #6 of the BS EN 60651 and #5.5.4 in BS 7580 Part 1.

Comment :

Correct calibration setting with associated calibrator is 113.9 dB(A)

Environmental conditions:

Pressure :	Temperature :	Relative humidity :
101.325 kPa	23.0 °C	50.0 %RH

Date of calibration: 24/07/2008

Date of issue: 24/07/2008

Supervisor: Ian Campbell MSC MIOA
Engineer

David Egan



Campbell Associates

www.campbell-associates.co.uk

Calibration Report

Certificate No.:4130

Manufacturer: Norsonic
Type : 1225
Serial no: 91775

Customer: Mouchel Ltd
Department: Acoustics
Place: St. Johns House, Queen Street
City: Manchester. M2 5JB
Contact Person: Mark Harrison

Measurement Results:

	Sensitivity : (dB re 1V/Pa)	Capacitance : (pF)
1:	-26.73	20.6
2:	-26.74	20.6
3:	-26.73	20.6
Result (Average) :	-26.73	20.6
Expanded Uncertainty:	0.10	2.00
Degree of Freedom:	>100	>100
Coverage Factor:	2.00	2.00

The following correction factors have been applied during the measurement:
Pressure :-0.010 dB/kPa Temperature :-0.007 dB/°C Relative humidity :0.000 dB/%RH

Reference Calibrator: WSC1 - Nor1253-24269. Volume correction: 0.000 dB

Records :K:\C A\Calibration\Nor-1504\Nor-1017 MicCal\2008\NOR1225_91775_M1.nmf

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Comment:

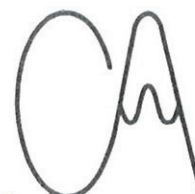
Environmental conditions:

Pressure :	Temperature :	Relative humidity :
101.176 \pm 0.003 kPa	24.0 \pm 1.2 °C	54.7 \pm 5.9 %RH

Date of calibration:24/07/2008

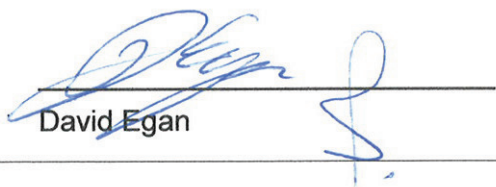
Date of issue:24/07/2008

Supervisor : Ian Campbell MSc MIOA
Engineer :



Campbell Associates

www.campbell-associates.co.uk



David Egan

CERTIFICAT DE CONFORMITE CONFORMITY CERTIFICATE

Nous, fabricant
We, manufacturer

01dB-Metravib
200, Chemin des Ormeaux
F 69578 LIMONEST Cedex- FRANCE

déclarons sous notre seule responsabilité que le produit suivant :
declare under our own responsibility that the following equipment :

Désignation : **Sonomètre**
Designation : Sound-level meter

Référence : BLUE SOLO 01
Reference :

Numéro de série : 61331
Sérial Number :

est conforme aux dispositions des normes suivantes :
complies with the requirements of the following standards :

	Norme <i>Standard</i>	Classe <i>Class</i>	Edition du <i>Edition of</i>
Sonomètre :	IEC 60651	1	10-2000
Sound-level meter :	IEC 60804	1	10-2000
	IEC 61672-1	1	05-2002
	IEC 1260	1	07-1995
	ANSI S1.11	1	
	ANSI S1.4		2001

et répond en tout point, après vérification et essais, aux exigences spécifiées, aux normes et règlements applicables, sauf exceptions, réserves ou dérogations énumérées dans la présente déclaration de conformité.

After testing and verification, this device satisfies all specified requirements and applicable standards and regulations barring exceptions, reservations, or exemptions listed in this certificate of conformity.

Date
Date

05/12/08

Responsable Département Produits
Head of Products Department

Laurent Faiget



01dB-Metravib

Siège social : 200, Chemin des Ormeaux • F - 69578 Limonest Cedex
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SAS au capital de 2 015 810 € - SIRET : 409 800 708 00019 - 409 800 708 RCS Lyon - APE : 743 B - TVA FR B2 409 800 708



9 Figures

Figure 1 – Noise Monitoring Locations

Figure 2 – Daytime Grid Noise Map – Weekday PM Peak

1025014 - Edge Lane Central Retail and Leisure Park

Noise contour plot showing the predicted noise levels based upon the weekday PM peak traffic data

Figure 2

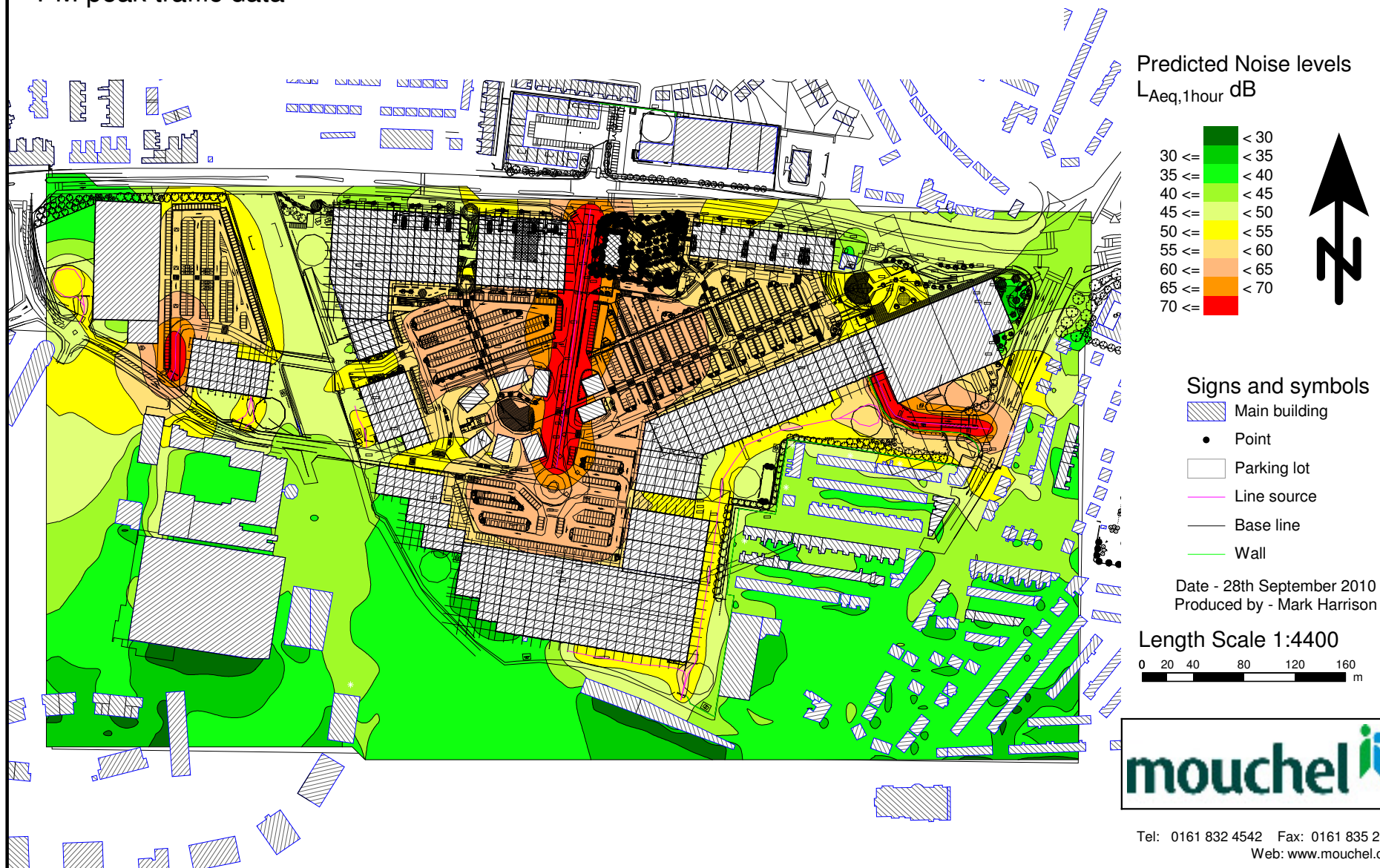


Figure 3 – Daytime Grid Noise Map – Weekend (Saturday) Peak

1025014 - Edge Lane Central Retail and Leisure Park

Noise contour plot showing the predicted noise levels based upon the weekend (Saturday) peak traffic data

Figure 3

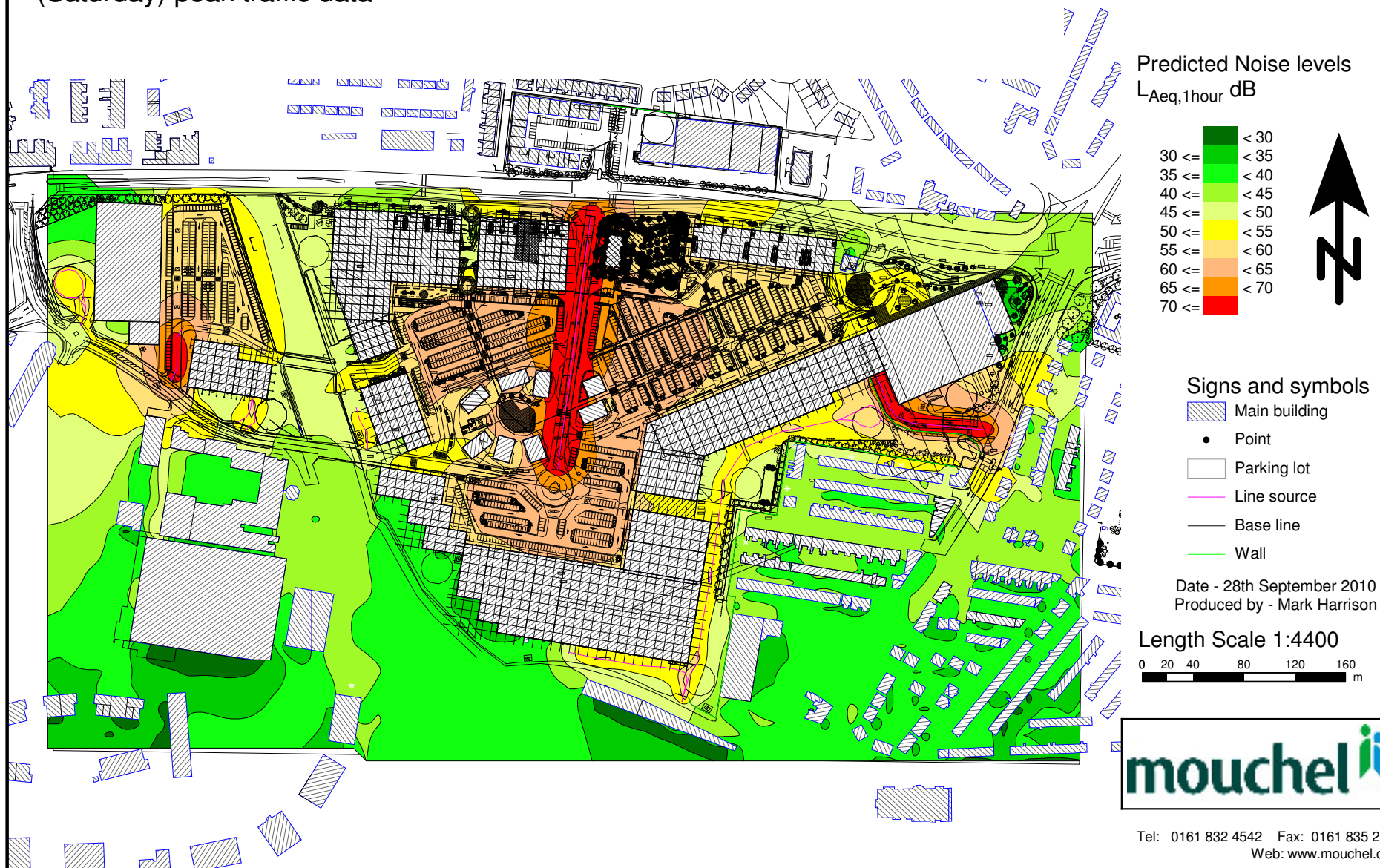


Figure 4 – Night-time Grid Noise Map – HGV movements only

1025014 - Edge Lane Central Retail and Leisure Park

Noise contour plot showing the predicted night-time noise levels based upon usage of the various service yards

Figure 4



Figure 5 – Noise mitigation measures – Fencing/Walls

1025014 - Edge Lane Central Retail and Leisure Park

Noise Mitigation Provision within the scope of the Development

Figure 5

